Vol. 144, No. 4 April, 1936 Price 25c

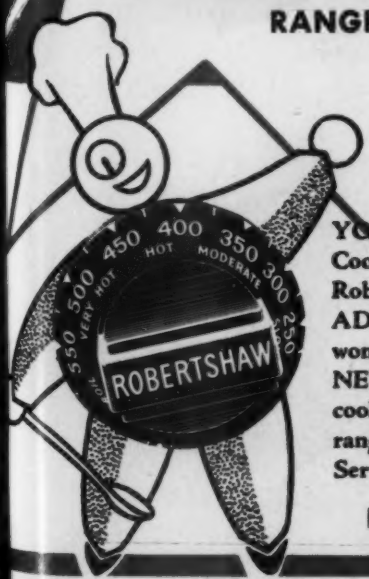
AMERICAN GAS JOURNAL

Ready to cut!

APR 16 1936
Smithsonian Deposit

NATIONALLY ADVERTISED
ROBERTSHAW
MEASURED-COOKING
WEEK
May 4 to 9

FEATURING A
$1,000.00
HOME SERVICE DIRECTOR
CONTEST
FOR DEMONSTRATIONS ON
ROBERTSHAW-EQUIPPED
RANGES



WITH A SHOWER OF SALES FOR RANGES EQUIPPED WITH
ROBERTSHAW OVEN-HEAT-CONTROL

YOU will feel the powerful pull of Measured-Cooking Week. It will sell ranges equipped with Robertshaw! ROBERTSHAW CONSUMER ADS in Collier's, the National Weekly, tell women to wait for the week! GAS COMPANY NEWSPAPER ADS tell customers to come to cooking demonstrations on Robertshaw-equipped ranges during the week! CASH PRIZES to Home Service Directors will put enthusiasm behind the week! DEALER NEWSPAPER ADS feature Robertshaw-equipped ranges every day of the week! MEASURED-COOKING WEEK is ready to break—first week in May. Be ready with Robertshaw Oven-Heat-Control ranges. What a week to create interest and sales! Write for complete plans.

You will get the same splendid service from ranges equipped with GRAYSON dials, made by a subsidiary of Robertshaw Thermostat Co.

ROBERTSHAW THERMOSTAT COMPANY • Youngwood, Penna.

DOMESTIC METERS

by

EMCO

IRONCLAD METERS

TIN METERS

These are the meters you need if you are going to install equipment that will measure accurately, with a minimum maintenance, for years to come. In doing so, you build up your greatest asset – better public relations.

No one type of domestic meter is suitable for all conditions. That's why EMCO developed a complete line – Iron, Curb, Tin – embodying exclusive EMCO features. On new services install new meters – Buy EMCOs.

EMCO METERS

CURB BOX METERS

NORDSTROM METER COCKS

If you want positive shut-off, quick easy opening and closing Meter cocks—specify and install only lubricated NORDSTROMS.

PITTSBURGH EQUITABLE METER CO.

MERCO NORDSTROM VALVE CO.

MAIN OFFICES PITTSBURGH, PA.

ATLANTA BUFFALO CHICAGO MEMPHIS
NEW YORK COLUMBIA KANSAS CITY PHILADELPHIA TULSA HOUSTON LOS ANGELES OAKLAND

AMERICAN GAS JOURNAL, April, 1936, Vol. 144, No. 4. Published monthly by American Gas Journal, Inc., at 34 North Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 East Park Place, New York, N. Y. Entered as second-class matter, October 7, 1928, at the post office at East Stroudsburg, Pa., under the Act of March 3, 1879.

Simple Assembly—NOT Field Fabrication

With the Dresser Coupling, most of the work is done before field work begins. There is no field fabrication. The few, simple, *factory-made* parts are quickly and easily *assembled* on plain-end pipe by unskilled labor, above or in the ditch. Such *built-in* simplicity is not altered by the "human equation." The standard parts can go together in only one way—the permanently tight way! And only one type of tool is required—a wrench. Folder No. 355 tells you how to *simplify* your pipe-line work with Dresser Couplings—insuring permanent tightness, flexibility, strength, and *true* economy! Ask for it by number.

S. R. DRESSER MANUFACTURING CO. • BRADFORD, PA.

In Canada: Dresser Manufacturing Company, Limited, 32 Front Street, West, Toronto, Ontario

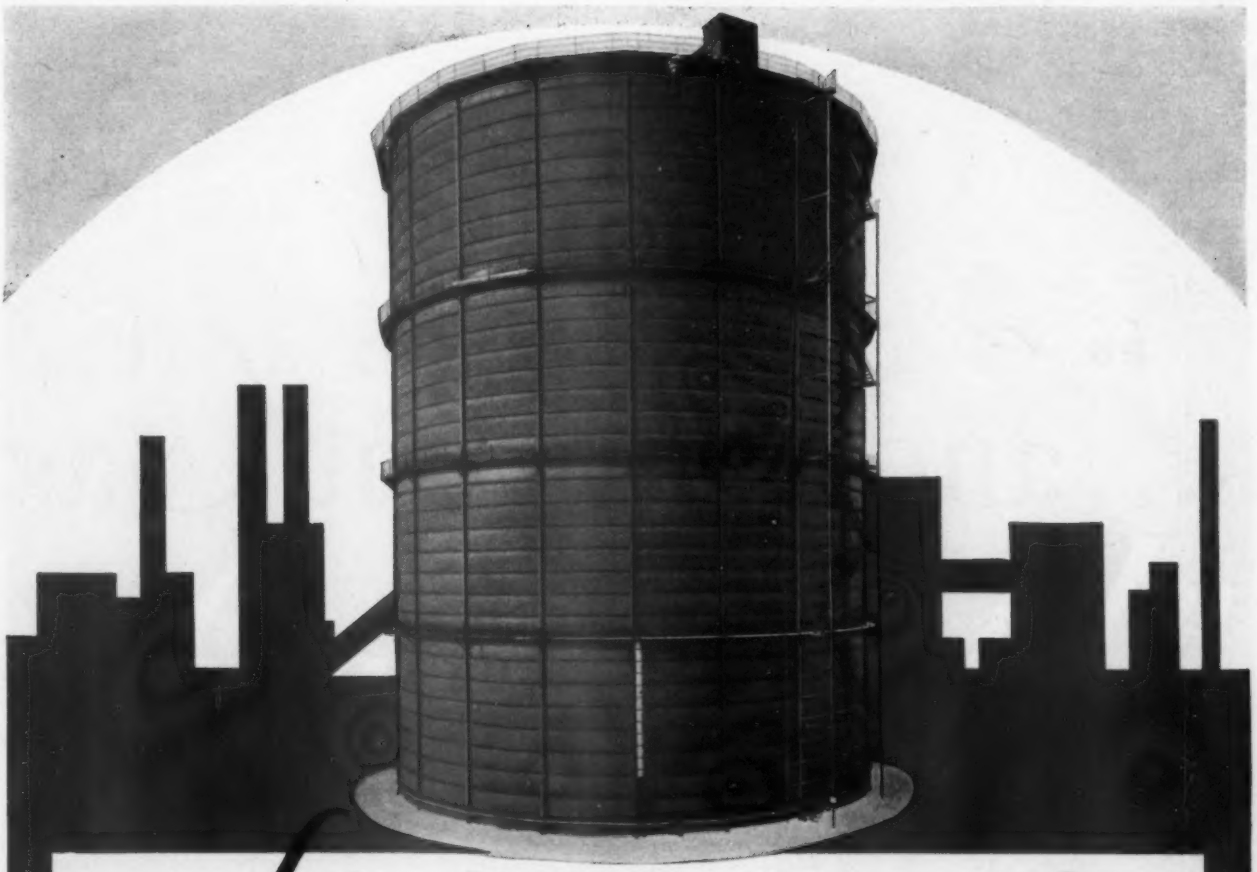
How simple! Common labor and a single tool are all that's needed to install the mechanical joints made by members of this Association. Rigid tests by the A. G. A. laboratory have proved them gas-tight under all working pressures.

These improved stuffing-box type joints "step up" the service of a material unequalled for long life. Look at this gallant old cast iron main, installed more than 100 years ago in Baltimore. Cast iron pipe—bell and spigot, plain end or flanged—is available in 1¼ to 84 inches diameter.

CAST IRON PIPE

THE STANDARD MATERIAL FOR DISTRIBUTION MAINS

Cast Iron Pipe Research Assn., Thos. F. Wolfe, Research Engineer, 1035 Peoples Gas Bldg., Chicago



Selected because of Demonstrated Superiority

The Hudson Valley Fuel Corporation (Niagara Hudson system) chose the Bartlett Hayward Center Column Waterless Gas Holder with M. A. N. seal because of its demonstrated superiority. This holder, having a capacity of 2,000,000 cu. ft. was placed in operation on January 16, 1936.

THE RECORD

Fifty-three Bartlett Hayward Waterless Holders in Service in America.

Total Capacity 317,220,000 cubic feet.

The Only Waterless Holder
With A Positive Fluid Seal.

THE BARTLETT HAYWARD COMPANY
BALTIMORE, MARYLAND

"...and I thought Gas was *Old-*

TODAY, gas refrigeration is bringing a new conception of gas and gas service to those who may have come to think of other fuels as more up-to-date, because more recently popularized, than gas.

The gas refrigerator proves to these people that with gas they secure an appliance which not only offers the last word in modern beauty and convenience, but also provides important operating advantages no other type of refrigerator can match.

In thus establishing the modernity of gas, the gas refrigerator builds important good will for the individual company and for the entire gas industry. Yet this benefit is but one of many that result from aggressive refrigeration selling.

Every gas refrigerator installed increases a customer's requirements by approximately 1800 cu. ft. (mfd. gas) monthly . . . provides a worthwhile merchandising profit without requiring new plant outlay...creates interest in other gas-using appliances. And because it helps insure an all-gas kitchen, the gas refrigerator protects the $250 investment which every domestic meter represents.

You will want to make sure that *your* company is prepared and ready for the big refrigerator buying months ahead. The new 1936 Electrolux gives you a product that is even more sales-inviting than the one which won so many families to gas refrigeration last year. In addition, the greatest advertising campaign in gas refrigeration history is helping to steadily increase the acceptance of Electrolux in your community and throughout the country. Decide now . . . to *March to Leadership with Gas Refrigeration* during the coming year! Servel, Inc., Electrolux Refrigerator Sales Division, Evansville, Indiana.

New Air-Cooled **ELECTROLUX**
THE SERVEL *Gas Refrigerator*

"I never realized how modern GAS was until I got my gas refrigerator."
fashioned!"
"Our GAS refrigerator is the most beautiful thing you've ever seen."
"Our refrigerator runs on GAS for amazingly little . . . just a few pennies a day."
"We picked the GAS refrigerator because it's years ahead in worthwhile conveniences."

GAS
DISTRIBUTION

Design
and
Construction

From MAINE - -
- - To MOBILE

THE U. G. I. CONTRACTING COMPANY

Division of

UNITED ENGINEERS & CONSTRUCTORS INC.

New York Philadelphia Chicago

MAXIMUM RETURN TO CLIENTS PER DOLLAR EXPENDED

VOLUME 143,
NUMBER 4

AMERICAN GAS JOURNAL

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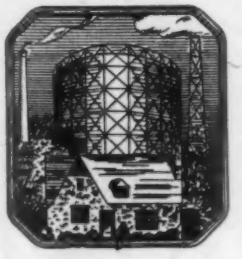

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MODERN METHODS in industrial gas measurement

Base Pressure and Base Volume Indexes take mathematics out of customer relations . . . eliminating the need for chart calculations to determine billing data.

The modern installation of the Atlanta Gas Light Company illustrated gives the customer at all times a complete knowledge of fuel consumed.

These five 500B Ironcase Meters provide a capacity of 75,000 cubic feet an hour, and are the last word in safeguarding customer satisfaction with the use of gas fuel. Their one-piece body castings eliminate internal leakages; equipped with complete Alemite lubrication systems, and dust protection for the bearings, Ironcase Meters likewise insure a much longer period of accuracy and low cost operation.

These modern installations all over the world are adding to the value of industrial gas service.

If you do not have a copy of Bulletin EG40 it will be mailed you promptly on request.

334

AMERICAN METER COMPANY
INCORPORATED
The World's Largest Manufacturers of Gas Meters and Allied Apparatus
ESTABLISHED 1816

GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK, N. Y.

APRIL 1936

AMERICAN GAS JOURNAL

VOLUME 144 NO. 4

Customer Cooperative Plan A

A Modern Promotional Gas Rate That Successfully Meets Electric Competition

By J. L. Underhill

President, Ware Gas Company, Ware, Massachusetts

SPURRED by electric competition and encouraged by the success of a promotional water heater campaign carried to a successful conclusion in 1935, the Ware Gas Company recently adopted a new type of inducement rate which incorporates a radical departure from conventional rate forms now used in the gas industry. The principal deviation from accepted rate practice lies in the addition of a clause which provides for the purchase of gas equipment as a basic part of the commodity charge for service. A study of a bulletin issued by the Rate Structure Committee of the American Gas Association late in 1935, and prepared by its present Chairman, Mr. Alfred I. Phillips, discloses a growing use of promotional rates. Principal among these are; objective rates, profit sharing rates and service-at-cost rates. These new rate forms, as Mr. Phillips points out, are the outgrowth of more intensive competition, uncertainty in the utility industry caused by the continued loss of business, and increasing tax burdens and political domination.

In Ware, Massachusetts, where this rate was inaugurated, we are faced with strong electric competition, particularly in respect to our domestic cooking load. The electric company for some time had been developing intensively the sale of electric ranges by means of promotional rates. This resulted, in some degree, to the invasion of our most profitable field of revenue. One of the most effective electric rates initiated was their so-called "Opportunity Purchase Plan," which was put in service in 1935. As an inducement under this latter arrangement, a customer who purchased an electric range was allowed half the increase in his monthly electric bill as a credit against its cost, until such time as the successive monthly credits liquidated the full purchase price of the range. We found ourselves practically defenseless against competition of this character with the rate schedules we then had in existence, and for some time we were undecided as to the most satisfactory means of coping with it. After considerable study we were convinced that only a gas rate of like nature and offering wider advantages would be accepted by the public on a competitive basis, and so we evolved what we term our "Customer Cooperative Plan A." We purposely broadened the scope of its effectiveness so that the consumer would receive greater benefits from its more liberal provisions. In its final form and as approved by the Massachusetts Department of Public Utilities, the rate is as follows:

OPTIONAL GENERAL SERVICE RATE—CUSTOMER COOPERATIVE PLAN A
M. D. P. U. No. 8
(Optional for Domestic Consumers now served under Genl. Service Rate)

Availability: Available on a contract basis to Domestic or Household consumers purchasing gas burning equipment under the terms hereof:

Type of Rate: Block

RATE:

	Per 100 cubic feet Gross	Discount	Net
First 100 cubic feet per month	.65	.05	.60
Next 100 cubic feet per month	.45	.05	.40
Next 200 cubic feet per month	.40	.05	.35
Next 200 cubic feet per month	.35	.05	.30
Next 200 cubic feet per month	.30	.05	.25
Next 4,200 cubic feet per month	.25	.05	.20
All over 5,000 cubic feet per month	.15	.05	.10

DISCOUNT: Discounts noted above in body of rate will be allowed when bills are paid within ten (10) days after they are issued.

MINIMUM BILL: The monthly minimum charge under this rate shall be $2.50. No discount shal. apply in the case of this monthly minimum charge.

PURPOSE AND CHARACTER OF SERVICE: This rate is promulgated in order that domestic and household consumers of the Ware Gas Company may avail themselves of modern gas appliances for their homes on a "pay as used" basis; payment for such appliances to be rendered as a part of the cost of service under this rate.

TERMS OF CONTRACT UNDER COOPERATIVE PLAN A:

The following regulations will apply to those customers adopting

this rate:

(1) Gas burning equipment for use by domestic or household consumers generally in their homes will be sold as a part of this service rate.

(2) A domestic or household consumer contracting to use this rate may purchase gas burning equipment to the maximum sales price of $250.00 on the following basis:

One half of the monthly gas bill calculated in accordance with the terms of this rate shall be allowed as payment towards equipment so purchased. The other half of the monthly gas bill will be accepted in payment of the monthly gas service rendered under this rate.

(3) Under the terms of this rate an amount of $24.00 per annum for each $100.00 of merchandise sold and purchased must be collected and credited on merchandise purchased as a part of this rate. If monthly credits do not total to this amount, any balance due for the year will become due and payable on the successive annual anniversaries of the date of contract for this rate and until merchandise is paid for in full.

Terms of this rate expire on the date of final payment for merchandise purchased hereunder and service will continue on the lowest applicable rate schedule available at that date.

(4) Merchandise purchased by consumers under the terms of this rate shall remain the personal property of the Ware Gas Company until paid for in full and in the event of non-payment of amount or amounts due under the contract for this rate, the Company shall have the right to immediately retake possession of any merchandise so purchased hereunder and shall be entitled to retain as rental for the use of the same all payments made prior to the date of such non-payment.

REQUIREMENTS: Suitable indication of the responsibility of the applicant for this rate, financial and otherwise, is required.

GENERAL: This rate is filed for experimental purposes for a period of one year automatically renewable unless application for cancellation is made before the end of the year. Renewal periods shall be for one year dating from February first.

From the foregoing it may be concluded that a rate of this type has very definite advantages in combatting electric competition. It also affords the consumer in moderate circumstances a satisfactory means of acquiring modern gas appliances. As all appliances are paid for through credits allowed on the monthly gas bill, the process of acquisition is simplified for the consumer and the plan for that reason has been found to meet ready consumer acceptance. In addition, a substantial reduction in gas rate is provided during the purchase period of equipment. Virtually, gas equipment purchased under this plan is paid for out of savings, or as we like to tell our customers: "Pay as You Cook."

To illustrate the method of publicizing the newly developed rate, Figure 1 shows the initial advertisement placed in the Ware newspaper. The space use for this announcement was one third of a page, prominently displayed. Figure 2 shows a follow up ad which sets forth in detail how to go about purchasing gas equipment and explains to the customer the operation of "Cooperative Plan A."

The "stand patter" may argue that a rate of this type is reactionary and unnecessary in an industry as old and staid as the gas industry. However, the fact remains that staidness does not of itself make for immunity from a competitor that is trying quietly to absorb substantial portions of our most remunerative load—the domestic cooking load. We might here consider a parallel between the gas industry and the rail transportation industry and point to the result of the latter's failure to recognize and meet competition as it developed while there was yet time. Truly, the time element plays an increasingly important role in the rapidly changing economic cycle and the gas industry must challenge all comers in order to retain its dominance in the field of domestic fuels.

On the basis of figures presented by Mr. Herman Russell at the recent business conference of the New England Gas Association* electric cooking and water heating in the home will increase electric revenue from four to eleven times above its present level. A little sober reflection should, therefore, convince even the most ardent gas man that the gas

**Reproduced on page 27, March 1936, issue American Gas Journal.*

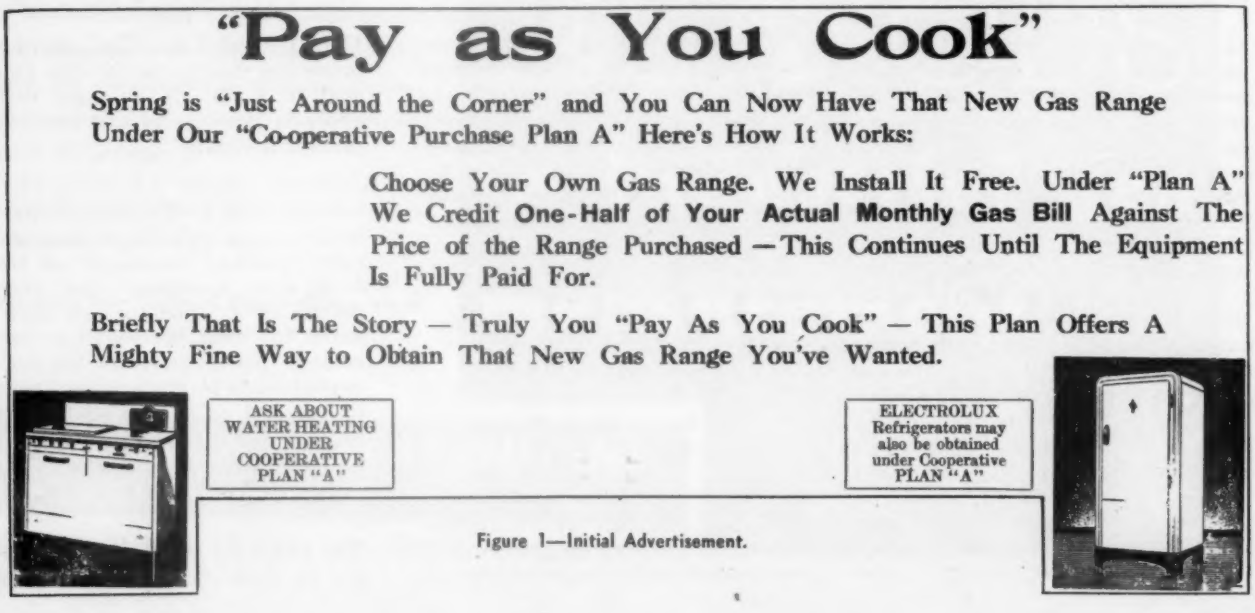

"Pay as You Cook"
Spring is "Just Around the Corner" and You Can Now Have That New Gas Range Under Our "Co-operative Purchase Plan A" Here's How It Works:
Choose Your Own Gas Range. We Install It Free. Under "Plan A" We Credit One-Half of Your Actual Monthly Gas Bill Against The Price of the Range Purchased — This Continues Until The Equipment Is Fully Paid For.
Briefly That Is The Story — Truly You "Pay As You Cook" — This Plan Offers A Mighty Fine Way to Obtain That New Gas Range You've Wanted.
ASK ABOUT WATER HEATING UNDER COOPERATIVE PLAN "A"
ELECTROLUX Refrigerators may also be obtained under Cooperative PLAN "A"

Figure 1—Initial Advertisement.

industry has no transient rival in electric competition. It has come to stay, and we need show no hesitancy in admitting the fact and take some immediate constructive action to combat it. After all, the industry that succeeds in furnishing heat in a manner and at the price most acceptable to the consumer, must ultimately be the victor. No magic is involved; no complicated formulae; the solution lies in satisfying the customer. That is the problem and we are gas men. What are we going to do about it?

If the success in Ware can be taken as a criterion, we have clearly demonstrated that, given proper promotional rates plus intelligent advertising and aggressive merchandising methods, the gas industry need have little fear of losing any substantial portion of its domestic load under present conditions. However, to attempt to retain the confidence of the public with the rate structures which very many gas companies still have, is a short-sighted policy and one which will eventually lead to our undoing unless corrected before it is is too late.

While electric competition in Ware forced us in the beginning to the extreme of adopting the Cooperative Type of rate, much against our better judgment, subsequent experience with it has entirely changed our views and given us confidence in its effectiveness. For a while we were reluctant to admit its value, but we have learned that the public reacts favorably to the Cooperative Plan of merchandising and that it definitely creates improved customer relations. Although the plan was developed purely as a defensive measure on our part, we are learning to use it as one of the most effective offensive agencies at our command. However, the underlying principle of a rate of this nature must not be violated. Hidden charges and subterfuge have no place in it and the willingness of the consumer to favor the gas industry with his continued patronage will depend entirely on our sincerity of purpose and performance.

It may be stated here without fear of contradiction, that the present load factor of both plant and distribution systems will justify more intelligent study in the matter of establishing new rate bases. Present requirements point favorably to a more general use of increment gas cost in the determination of rates that will allow for a more widespread disposal of surplus gas. Somehow the gas industry must break away from hidebound tradition and again establish itself in a progressive, forward looking position that will enable it to fearlessly challenge all those who cast covetous eyes at the load we have fought so hard to build.

YOU CAN NOW HAVE THIS MODERN ECONOMICAL GAS RANGE
on a
"Pay as You Cook" BASIS
Under Our NEW
Co-operative Plan "A"
This is a New Service under which you may enjoy all the advantages of Modern Up-to-date Gas Appliances and pay for them on a basis of half your monthly gas bill under plan "A".
HERE IS THE PLAN: Select the gas equipment you have been wanting and in payment we will credit against the purchase price ONE-HALF OF YOUR MONTHLY GAS BILL under Plan "A"
NOW IS THE TIME: Modernize your kitchen now and at a considerable saving. Gain all the advantages and saving of modern gas equipment under the new plan.
NO DOWN PAYMENT: Your old equipment is the down payment and installation is free on all equipment purchased under the NEW CO-OPERATIVE PLAN "A".
ACT NOW: The next time you are down town call at our display room at 7 North Street. Learn about this new CO-OPERATIVE PLAN "A". See our display of modern gas ranges, water heaters and ELECTROLUX gas refrigerators. Learn how you can take advantage of this new offer without a down payment and you will not hesitate to buy and "PAY AS YOU COOK."

Figure 2—Follow Up.

National Advertising Campaign Assured

Herman Russell of Rochester, N. Y., chairman of the Committee on National Advertising of the American Gas Association, announces that his committee has obtained from gas companies pledges of support in excess of the quota originally set. The launching of the advertising program is thus assured.

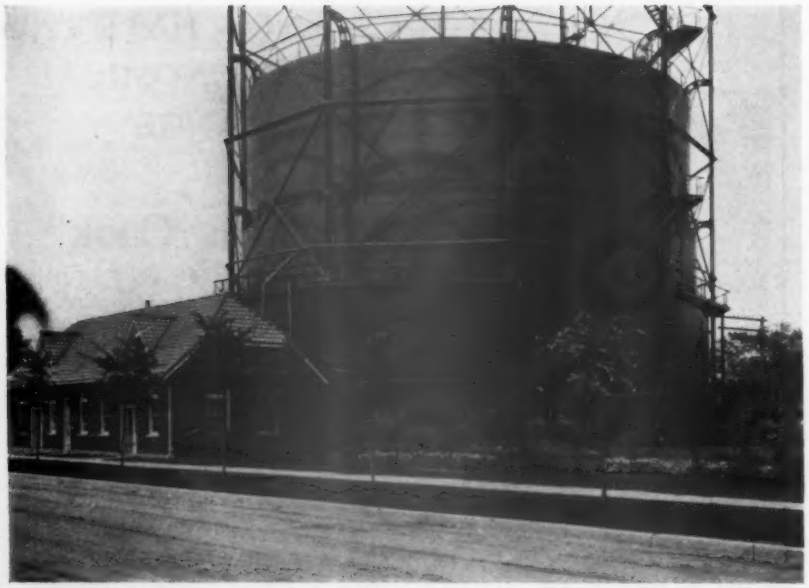
In recognition of Mr. Russell's efforts in obtaining favorable action from companies having in service more than seventy per cent of the nation's gas meters, the Association's Executive Board at its meeting in Chicago, March 18, unanimously adopted the following resolution offered by B. J. Mullaney, vice-president of The Peoples Gas Light & Coke Company of Chicago:

"Mr. Russell's report, as Chairman of the A. G. A. Committee on National Advertising marks the successful completion of an extremely difficult task.

"The doing of it obviously was an arduous round of reconciling and coordinating many discordant factors, such as regional and local gas company problems, varying company policies and individual ideas, and the difficulties were peculiarly aggravated by the advertising objective, since practically every business executive has his own particular—and fixed—notions of advertising.

"Therefore, the Executive Board of the American Gas Association hereby extends to Chairman Russell and his associates of the Committee on National Advertising this expression of congratulation and thanks for what they have done so well."

Mr. Russell's associates on the committee are: F. M. Banks, Walter C. Beckjord, Davis M. DeBard, Conrad N. Lauer, Henry Obermeyer, C. E. Paige, James F. Pollard, Harold F. Smiddy, H. R. Sterrett, T. J. Strickler and P. S. Young.



An artistically landscaped regulator house and holder station in Denver.

By
ERICK LARSON

Regulator Structures

Part V—Design of Houses

Material

THE same materials are available for houses as for pits. Brick is commonly used in sections where its cost is not excessive. The locality may dictate the selection of brick for appearances. In residential sections, adjacent to frequently traveled roads, near resorts and under similar conditions an ornamental brick is frequently a source of favorable comment. The use of common brick or concrete stucco is not as satisfactory since the initial good appearance of stucco cannot be maintained, and repairs are necessary more often.

It is advisable to consult an architect when designing a standard regulator house as such work is an art in itself.

In industrial or rural sections standardized metal buildings may be used for regulator houses. Such structures may be assembled without employing specialists, and provide a satisfactory housing at low cost. Rather than specify a particular size, effort should generally be made to use a building of standard dimensions.

Metallic buildings are most commonly coated with a corrosion resisting metallic covering. While resistant, such coatings are not permanent protection. The metallic coatings, such as galvanizing, should be allowed to weather for two or three years or until signs of rusting appear before paint is applied, as paint does not adhere readily to the new surfaces.

Concrete block regulator houses present an excellent appearance which ordinarily lasts for a number of years. As color changes the face may be painted. An attractive appearance may be obtained by planting vines adapted to soil and climatic conditions around the building when it is first erected. Hardy vines require practically no attention except trimming around doors and windows.

Illumination

The value of plenty of windows

Line regulator station in Mobile, Alabama. Ventilation adequately provided by both a monitor on roof and by the omission of bricks to provide circulation at flow level.

for ventilation is equalled in their desirability for improving illumination. Unless particular local conditions make the use of regular window glass preferable, wired opaque panes should be used. They are not easily shattered and they prevent the curious from seeing equipment or tools in the interior of the structure. While opaque glass does not allow as much light to enter as transparent glass, the general illumination is satisfactory. Opaque glass does not require as frequent cleaning to maintain a presentable appearance as transparent glass.

To improve ventilation windows are frequently left ajar and in such cases proper precautions should be taken to prevent unauthorized persons from gaining entrance. A heavy screen or ornamental bars are easily fitted and give protection as well as a pleasing appearance if properly designed. Windows which project outward when open add to the difficulty of designing and the cost of installing such protection. The type of window which must be raised and lowered will not provide as much opening for ventilation as will an equal area of the swinging type but the average window usually provides a large excess of opening for ventilating purposes.

Natural illumination is usually supplemented by electric lights, the design and quality of which would be similar to that for pits. A light outside the door of the structure facilitates the selection of material and tools from the stock carried on a truck or automobiles. Some companies have had door lights connected to street light circuits so that they will always be lit after dark; but unless such lighting is also used for some other purpose such as advertising, the advantages are doubtful.

Ventilation

In addition to an effective roof type ventilator, it is desirable to have windows on each side of a regulator house so as to make it possible to secure a current of air through the building regardless of the direction of the wind. The air leakage past window framing is more effective in ventilating a structure when windows are on all sides. A door on one side may be substituted for windows.

Ventilating fans are seldom installed in houses as air changes are much more frequent than in pits because of air infiltration around windows and doors. Also, a roof ventilator is much more efficient than an ordinary vent in a pit. When regulators occupy one room of a structure used also for other purposes a ventilating fan may be desirable. The fan drive should not be any type which may produce a spark. Preferable to a fan is a large ventilating duct carried up the outside of the structure, if room is not available inside, and topped with a canopy or regular roof type ventilator.

Redesign of Adapted Structures

For economical reasons it sometimes becomes necessary to adapt existing structures for use as regulator housings. One of the greatest disadvantages is the danger that such locations may be visited by unauthorized persons. Experience has demonstrated that regulators in structures used for other purposes also have been more susceptible to tampering than those located in pits or especially provided houses. When the regulator room must be left accessible to other than responsible em-

Regulator stations. Note ventilator at peak of roof and vent line carried above peak of roof. The large windows provide excellent natural ventilation.

ployees warning signs should be prominently displayed. A guard rail placed around equipment also helps to prevent accidental knocking off of weights or striking of vital parts. When impossible to partition off the regulator section it is often desirable to place a wire guard around the important parts, if not all, of the regulator. Another suggested precaution is the locking on of regulator weights and the locking of all valves.

Ventilation

Ventilation in the adapted section should follow the same general practices as for regulator houses as well as all common safety features.

Placing of regulators in rooms occupied by other gas equipment such as compressors, unrelated metering equipment, tar pumps, etc., is not desirable. The general principle is that regulator equipment should be accessible regardless of accidents to other equipment and should be where work on other equipment will not be likely to cause an accident to the regulator.

Illumination

The illumination of regulator houses should be looked on as an absolute necessity. Likewise there seems to be no logical reason why this same practice should not be regarded as essential in a pit as in a house since the operations carried on within the structures are identical.

The fixtures in a regulator structure should be of special gas tight type, switches should be approved by fire underwriters for gaseous atmospheres and the wiring should all be in conduit of excellent quality. A pit lighting installation should be superior in quality to the average wiring installation. The space around conduit where it enters the structure should be sealed as recommended for all other entering ducts.

The location of the lights should be given particular consideration with view to securing the greatest intensity of light where most needed. This is apt to be near the main section of the regulator or in the immediate vicinity of any other apparatus in the structure which requires frequent inspection and maintenance. The usual position in which the inspector or maintenance man stands is an important consideration as fixtures should be located so as to provide the least possible shading of parts by a workman. As an added convenience for the inspector and repairman a socket of a type approved for gaseous atmospheres is usually installed so that an extension light can be plugged in and carried where desired. The greatest necessity for a high intensity portable light is at the handhole plate

on the valve chamber of the regulator. A convenient method of holding the portable lamp is by means of a doctor's headpiece as the inspector's or repairman's head is always directly in front of the manhole during inspection or maintenance work on the valves.

When electric current is to be supplied for other uses than lights in a regulator structure the nature of use will determine the desirable location for the other equipment. The best practice is to have any motors driving ventilators or oil sprays in a separate chamber.

The specifications and quality of fixtures above mentioned should be insisted upon for regulator houses or those sections of existing buildings used for regulators.

Safety Considerations

In the design of structures to house regulators, the safety of workmen should be an important consideration. In the discussion of house regulators many features were mentioned which added to safety and at the same time facilitated installation and maintenance.

A structure should be constructed to prevent as far as practical entrance of foreign material, animals and unauthorized persons. Safety requires a structure which will keep out both rain and ground water and be proof against the entrance of excessive dust or dirt. Living creatures are not often considered as particularly harmful but the ability of such creatures to create trouble is dependent upon the particular equipment existing in the structure. Bugs and small animals may affect rubber diaphragms, vents, recording devices, gauges and many other sensitive apparatus located in the structure. In parts of the country where poisonous snakes are common particular care should be exercised to exclude them.

Operating Safety

The most essential safety rule is the thorough ventilating of all regulator structures before entrance by an employee. In manufactured gas sections even the slightest odor should be the occasion for thorough ventilating. Where natural gas is distributed, the lack of odor adds to the difficulty of ascertaining the quality of the atmosphere in a regulator structure. It should therefore be an ironclad rule that workmen must test the atmosphere before entering the structure. High concentrations of natural gas may only slightly affect a person exposed for short periods but for that very reason an attitude of carelessness is

Standard metal house easily assembled. Note small ventilator.

easily developed and workmen may enter and remain in a gas filled structure until overcome. It is particularly essential that gas company employees avoid being overcome by a gas whether natural or manufactured as the attendant publicity may do material harm to the business of the company.

It would seem unnecessary to caution men against extinguishing cigarettes, pipes or any other type of open flame before entering a structure yet many accidents are caused through thoughtlessness in this matter. Written rules do not make men thoughtful and, therefore, it is essential to convince thoroughly any who must enter regulator structures that their own safety and well being is dependent on continuous thoughtfullness.

As an added precaution many utilities require that all matches be left in the truck to guard against any possible accidents from them. While such a rule may appear to be extreme it is through such precautionary measures that accidents are minimized.

An automobile exhaust in close proximity to an opening into a regulator structure has been known to cause an explosion. While convenience and safety require that the truck with all its tools and apparatus be

A line regulator station in an industrial section. Note large ventilator partly visible above roof.

as close to the structure as possible the motor should be turned off before the structure is opened. When water pumps or blowers are connected to the truck engine and the motor must be kept going the exhaust should be kept away from any opening in the structure.

Another source of sparks is a tool dropping on the concrete, brick or steel flooring or on the apparatus. The use of non-sparking tools is an added safety feature.

When foreign matter is the cause of a regulator valve disc becoming ineffective a common practice is to open up the inlet shut off valve after the regulator valve has been removed from the regulator, leaving the handhole plate off and blowing the gas out through the handhole plate. This practice is not a good one but can be made safe by having a flange the same size as the handhole plate opening drilled out and attached to a hose through which the gas may be led to the atmosphere at a safe distance from the structure. When blown directly into the structure hard particles of foreign matter striking against the regulator may produce a spark. When a vent hose is used the spark may be produced but would cause no trouble. As a precaution the outlet of any venting hose should be turned upward so that any hard foreign particles would lose their momentum before striking hard road or sidewalk surfaces.

It is believed that static charges of electricity have been the cause of several explosions within regulator and meter structures. The methods used particularly in testing or purging regulators or meters should be studied and precautions taken to guard against an accumulation of static electricity.

A man may work in an atmosphere of natural gas of rather high concentration and not feel nauseated but a sufficient quantity of the gas will permeate his clothing so that any source of flame applied soon after leaving the gaseous atmosphere may result in serious burns. After leaving such natural gas atmospheres workmen should thoroughly ventilate their clothing by standing in the open particularly where wind may strike.

Safety extends not only to the conditions within a pit and immediately on top but to the surrounding area where men are likely to go. In city territories the surrounding conditions are dictated by the city. In some suburban and rural districts pits are installed where bushes or grass grow on all sides. Accidents have occurred through broken glass, nails and similar debris.

Who Are Your Public Relations Representatives?

H. J. Johnson

Manager, Public Utility Sales Division
Remington Rand, Inc., Buffalo, N. Y.

VOLUMES have been written and spoken on the subject of public relations. Some very clever and effective advertising has been done on the subject, and large sums of money have been spent in an endeavor to build up good will for the company, but how much thought has been given to the subject of "Who are the Public Relations Representatives?" How much attention has been given to the subject of selecting the employees who come under this classification with respect to their special and particular qualifications for the particular part that they will play in this very important activity? How much attention has been given to the subsequent training of these employees in better fitting them for handling the various problems which they encounter every day? What studies or observations have been made to determine how efficiently and how effectively each employee plays his or her part in the very vital relationship which their duties have in public contacts? What recognition has been given employees who have performed particularly meritorious service? What has been done in developing a real pride of organization with each and every employee in your organization? These and many other questions should be carefully considered when determining the present efficiency of handling customer relations.

In the discussion that follows we will attempt to discuss briefly the part which various groups of employees play in this activity.

Telephone Operators

Probably no employees in the entire organization come in contact with as many customers each day as the telephone operators. They should be carefully chosen for the quality of their voice, patience and general tact. Their job is particularly difficult because they must depend entirely on their voice to convey the proper impression. Other employees can exercise their general personality and a winsome smile, but the telephone operator must have a cheerful, friendly way of saying "Gas Company" that will warm the hearts of those who listen. How often we hear these kind of remarks —"What a grouch that telephone operator is," or "That's a darn sweet girl you have on the switchboard. Who is she?" These are the girls you have to depend on to create the impression to all who call your company by telephone that it is a pleasure to have them call.

These are the girls who must serve as hostesses and extend the kind of hospitality that you, as the company executive, will have reason to be proud of. Often those who call will be impatient; many others will not know whom to ask for or how to ask for the information which they desire. Your telephone operators must make it easy for them and give them every possible assistance and do it with a courtesy and a cheerfulness that will long be remembered.

Customer Contact Clerks

Do these clerks extend the kind of hospitality that you extend to those who visit you in your office or at your home? Do they leave an impression with the customer that it was a pleasure to have the opportunity of serving them? Do the customers with whom they come in contact leave your office with a friendly feeling and a sense of obligation to the company for the courteous and friendly way in which they were handled? This can only be done if they are greeted with a cheery smile, if these clerks listen with real interest and patience while the customer is explaining the problem, and then if they give evidence of going out of their way to provide the information required and act as though this particular contact was the most important duty which they had to perform. I have personally been very much irritated on several occasions by the very apparent impatience of the clerks and by the fact that they looked off in another direction and patience are such that they they were talking to me. It is undoubtedly true that they are subjected to many aggravating situations every day, but unless their disposition and patience are such that they can refrain from displaying this feeling they should by all means be put on some job where they do not come in contact with the public.

Complaint & Adjustment Clerks

These clerks have one of the most difficult assignments in the entire organization. Most of the customers with whom they come in contact have become irritated by some either real or imaginary grievance. Each clerk must therefore be particularly pleasant and considerate, while listening to the complaint and give every indication of being willing to meet the customer more than half way while accepting the responsibility for the error and expressing regret that it occurred. If the difficulty is due to a misunderstanding on the part of the customer they must make their explanation thoroughly convincing and do it in a manner which will avoid the possibility of making the customer feel humiliated in any way. This demands a careful selection of these employees and a particularly careful training in order that they may thoroughly understand the manner in which all kinds of problems originate and the relationship of the various departments at interest.

Application Clerks

The impression which is created with a customer at the time the original application for service is made or during subsequent moves from one location to another will very largely determine the future attitude which this customer will take toward the company. I have made personal observations in hundreds of companies of the manner in which this very important activity is handled, and in

very few instances have I observed a customer getting a "thank you" or even a smile. When a customer asked how soon service would be connected he received a rather impatient reply. Even though it is impossible to connect service the same day that the order is received, a clerk should at least manifest an interest and a solicitude in the customer's desire and need for the service. There should always be an expression of regret if it is impossible to meet the customer's request.

A customer is usually asked whether or not there is a meter on the premises, something which the customer should not be expected to know. This and other information should be maintained in such a manner that it is readily available. Very frequently a customer is told "You will have to make a deposit." No person likes to be told that they have to do anything.

Appliance Salesmen

The appliance salesmen should be carefully selected and even more carefully trained. The training should cover not only a complete and thorough knowledge of the mechanical features of each individual appliance but also the application of that appliance to the customer's own individual needs. Their sales presentation must be interesting, constructive and convincing. They must avoid every indication of applying high pressure methods. Instead of selling mechanical devices they must sell the increased comfort, convenience and service which the customer can secure from the use of the appliance that is being presented.

The salesman should be very carefully trained in connection with the manner in which a customer is approached; the manner in which the home is entered and the care that is used in removing and placing the coat, hat and overshoes. The personal appearance should be above all reproach.

Cashier

The cashier has an unusual opportunity to create a friendly impression with a customer. Who is there that doesn't expect a pleasant "thank you" and a friendly smile from the person in any organization or establishment to whom we pay our money? And yet how few and how outstanding are the instances where more than a very perfunctory expression of gratitude is received. These little courtesies require no additional time but what a difference they make in the impression of the company and its personnel that the customer carries away with him.

Meter Readers

The meter readers can tear down more good will than all other departments of a company can build up. Every customer is contacted once every month by some meter reader. Do your meter readers ring the door bell impatiently and do they greet the customer with a hurried and gruff "Read the gas meter?" In wet weather are they careful about not tracking in mud or do they conduct themselves as they would upon entering the home of a friend? Meter reading represents a form of customer contact that justifies the most careful consideration.

Collectors

Collectors have an extremely difficult task and must be particularly careful about the manner in which they approach a customer. They must show every consideration and must take a keen personal interest in the explanation which the customer makes. It is absolutely necessary for them to be firm but in doing so they must be particularly careful in getting the customer to look at this matter from the company's viewpoint. They must leave the customer with the impression that the company is perfectly fair in all of its dealing but in fairness to them and to other customers all bills must be paid. They must assist the customer in visualizing the fact that the gas company is particularly liberal in extension of credit in view of the fact that it sells a commodity which cannot be repossessed.

The inside Collection Department personnel must be equally careful in handling all customer requests for extension of bills or permission to make partial payment.

Credit Department Personnel

The Credit Department personnel have an outstanding opportunity to convince the customer that the company is perfectly willing to meet them more than half way and that any action which is necessary to take is merely based on good business practice. It is very important that every possible effort be made to avoid the possibility of the customer getting the impression that the gas company has a monopoly and can therefore be arbitrary in demanding whatever it cares to. It is an extremely simple matter to prove to a customer that the gas company is faced with competition just as serious as any other commercial institution, and that the business is even more hazardous because it cannot select the credit risks as other commercial institutions can.

Reception Clerks

This is a job that requires real diplomacy. People are coming and going all day, many have to sit and wait which always makes the time seem twice as long as it really is, and people very much dislike waiting. The reception clerk can make this ordeal much less difficult. She can be interesting and pleasant and her personality can be a power for good. She doesn't have to flirt and she doesn't have to blarney but she can make people feel very much at home. The reception clerk has an opportunity of extending real hospitality and be a gracious hostess.

Messenger Boys

Messenger boys are seldom thought of as public relations representatives, but many a favorable and lasting impression has been created by the courtesy and the neat personal appearance of messenger boys. A pleasant smile and a business like attitude will go far to create the impression that the company overlooks no opportunity to train its personnel and to always extend courteous service.

Elevator Operators

There is a remarkable difference in the way various elevators are operated. In many instances this seems to be considered the least important job with the result that individuals who do not seem to be qualified for any other assignment are made elevator operators. Their actions indicate that their job is a drudgery and something to be endured. Other elevator operators act as though they were the hosts and the passengers were the honored guests. They take the passengers for pleasant little journeys to one of the upper floors and they bring them back. They make them feel happy that they came to ride with them and they go away with good will toward the operator and toward the company. Courteous and pleasant elevator operators are more often the exception than the rule and for this reason one who is, is frequently commented on in a way that is extremely beneficial to the company.

Employee Social Contacts

There is no more important activity in the building of good public relations than to have all employees extremely careful in all of their so-

(Continued on page 56)

AS THE EDITOR SEES IT

The Customer Cooperative Plan

ELSEWHERE in this issue of the JOURNAL will be found a description of a new type of rate plan which may well bring further dismay to the already troubled rate engineer who is trying to retain some faith in his creed of cost and customer analysis.

The object of the plan is to sell modern gas appliances and thus block the inroads of other competing services. The way it operates is as follows: "A domestic or household consumer contracting to use this rate may purchase gas burning equipment to the maximum sales price of $250.00 on the following basis: One half of the monthly gas bill . . . shall be allowed as payment toward the equipment so purchased. The other half . . . will be accepted in payment of the monthly gas service rendered under this rate."

A premium with the gas bill! The gift of an appliance with the customer's agreement to use gas for a certain length of time! Call it what you like. It is a practical expedient developed to meet an actual situation. Other businesses, the publishing business included, have made effective use of premiums. Thirty years ago gas companies were giving away gas stoves or selling them for a mere pittance. That policy and a timely coal strike did much to build our cooking load.

After all is this rate plan so very different from those which several other companies have recently adopted? In Columbia, S. C., and Lock Haven and Renovo, Pa., there have been "half price gas" plans. The Coast Counties Gas and Electric Company (California) had a "free gas" plan last year and repeated it this year. A number of electric companies have had similar plans. The "Customer Cooperative Plan" is really a "half-price gas" plan with certain unusual but very practical regulations governing its application.

A few more facts: (1) The plan was developed in the conservative old State of Massachusetts; (2) it was approved by a state Utilities Commission which has thus far refused to approve an objective rate; (3) it seems to be getting results, and (4) it has been copied and put into effect by two companies up in the conservative State of Vermont where there is a gas company selling hot water by the gallon.

The operation of the Customer Cooperative Plan should be watched closely by the industry. It may prove to have numerous applications, particularly among the smaller companies.

National Advertising

The required support for the National Advertising Campaign has been assured, companies supplying approximately 72 per cent of the gas customers in the country have pledged their backing. The ground work has been completed, and another worth-while cooperative enterprise should be launched in the near future. Where will it take us? That question we cannot answer; but let none of us forget that the helm is in our hands, and the course we steer is of our own choosing.

The work done thus far by the Committee on National Advertising has been splendid, but it has been child's play compared with what lies ahead during the coming three years. Where shall it advertise and what shall it say? How can it cover most effectively the needs of the greatest number of individual companies? How can it reconcile the views of the independent company and the combination company, the manufactured gas company and the natural gas company, the small company and the large company? All of these are supporting the advertising campaign, and all of these are looking to the Committee to adopt a strong aggressive policy of telling the story of gas service truthfully, forcefully, without fear or favor and in such a way that each individual situation will receive the maximum benefit.

These are but examples of the real problems the Committee on National Advertising has to face. It needs not only the financial but the active moral support of every gas company. Its policies must necessarily be shaped by the needs and desires of those who are contributing the funds; so if you are whole-heartedly behind aggressive action, or if you have problems or suggestions that merit national attention, then by all means let the Committee hear from you.

Do not think for a moment that our competitors will meet our efforts lying down. They may be expected to move heaven and earth to forestall a nation-wide presentation of our story. In fact, it would not surprise us if a few combination companies, dominated by electric men and with carefully nurtured electric cooking and water heating businesses, sought to limit our advertising program to a restatement of worn-out platitudes under the guise of keeping the copy "dignified and conservative." The independent gas companies in particular are in no mood for anything but a full and aggressive presentation of the case, and that is the avowed policy of the Committee.

On the other hand it would be a mistake for the Committee to sponsor advertising tending to discredit the service rendered by electricity or any other competing fuel. The untrue claims made for such service should be shown up, but knocking a competitor is unnecessary if you have a good product, and is generally a sign of weakness. In fact, the knocks we have been receiving are alone an indication of how little real substance there is behind the claims of those who are seeking desperately to wrest our business from us. We need aggressive action; but clear cut statements of our own case, with proper comparisons of the satisfaction and economy of gas and other competing services should provide a sound basis for a complete and effective presentation.

Last summer a group of gas companies in the New England and Middle Atlantic states began to make plans for a series of cooperative radio broadcasts featuring the "Mystery Chef." From the outset the members of the JOURNAL staff were enthusiastic. We believed we could foresee a great amount of valuable publicity for gas service at a very moderate cost, so we gave the plan our fullest support. There were problems, delays, obstacles; but all of these were finally overcome. Today the success of the "Mystery Chef's" radio programs far exceeds the most sanguine expectations of the original sponsors or ourselves.

Meanwhile came the proposal for a second cooperative enterprise. At the Convention of the American Gas Association, Mr. James F. Pollard, now President of Seattle Gas Company, crystallized the sentiment of

(Continued on page 58)

Experience In Leak Proofing Bell And Spigot Joints

G. E. Hitz

Central Hudson Gas & Electric Corp.,
Poughkeepsie, N. Y.

THE subject of leakage in bell and spigot joints has been of great interest to Gas Distribution Engineers for many years, and it is the hope of the writer that this paper will be a small contribution to this problem.

We can all very clearly go back in memory and recall the progression of events which brings us to our own local situations at this time. Perhaps we can recall the days of the periodic overhauling, when we would as a matter of good operating practice, recaulk our joints as was indicated by barring operations. This was accepted practice and no great noise was heard about it.

Particularly in the last decade, conditions have changed in a great many properties. Refinements in the manufacture of gas, and the complete change to natural gas in many situations have resulted in the distribution of gas devoid of those agents which under the previous conditions kept our bell and spigot joints more or less tight.

Coincident to this change came the practice of laying street and highway pavements of a more permanent nature, which tended to aggravate the situation. Public authorities are not prone to let us dig up these pavements, and may I add that we too do it very reluctantly ourselves and at high cost!

Many remedies have been proposed and used to cope with these situations with varying degrees of success. Rehydration and oil fogging have been utilized as well as the placing of bell joint clamps and, in some cases, a complete rebuild of the individual joint, incorporating the use of a rubber ring. All of these methods have been used by us in our work.

In our four carburetted water gas systems in the Hudson River Valley, with approximately 160 miles of cast iron main, we gradually changed from low pressure saturated carburetted water gas, to transmitted dry gas. In another system we changed from coal gas to butane-air gas, with a strictly low pressure system fed from a water sealed holder.

In all of these situations a progression of troubles developed in due time; our first difficulty being from dust and finally an increase in joint leaks. With the development of oil fogging and resaturating equipment, these methods were promptly adopted along with rubber rings and bell joint clamps, but only partially relieved the situation.

Experimental Use of Joint Treating Liquids:

A few years ago we reasoned that if the fundamental cause of a joint leak was the absorption of the contained oils from the fibrous packing by the dry gas, the replacement of these oils should stop the leak.

Originally we selected appropriate locations in one of our smaller properties and proceeded to treat the mains with a heavy drip oil in an attempt to leak-proof the bell and spigot joints. Five elevated locations in the distribution system were selected as input points and sections of from five hundred to twelve hundred feet were treated. This work was checked by noting the effect on leaking joints and to our surprise stopped the leaks. Frequent check-ups were made and in most cases the joints began leaking again in a very short time due to a re-absorption of the oil by the gas. This experience demonstrated that our original reasoning was incomplete as we found later that the loss in volume of the jute by the loss of water was a major factor. The replacement of the oils, however, helpful, proved not only transient but inadequate to secure the original volume of moisture displacement.

Early in the work we decided that the liquid or mixture required for permanently sealing the joints should have very definite characteristics:

1. Low vapor pressure so that the liquid would not be absorbed by the gas.
2. Non-active chemically with the constituents of the gas.
3. Proper viscosity to permit flow through the main toward the drips and a ready absorption by the packing material.
4. Non-corrosive to metals and materials commonly used in main construction.
5. Non-deteriorating to joint materials such as rubber, jute, and other fibrous packing.
6. Hygroscopic in order to utilize any moisture that may be present in the gas to aid in resaturation.
7. To these was later added a final requirement that the liquid should have the same property as water in causing expansion of the jute fibres.

These specifications constituted too stringent a demand for any single liquid to meet and have eventually resulted in the mixture we are now using. All of the above features are present in this liquid, together with additional advantages as will be shown later.

To cover adequately all of the laboratory work accomplished would require a scope somewhat beyond the limits of this paper, which presents only some of the more important phases.

We first studied the behavior of joints which leaked. As is well known, a joint which does not leak, at say, a nominal pressure, and is subjected to a higher pressure will usually leak at the original pressure when the pressure is reduced. A tiny orifice is projected through the joint at the higher pressure which remains relatively, at the lower pressure. The principal cause of leakage in dried out joints was found to be a contraction in the volume of the packing due to the loss of absorbed water originally held in the jute. It was further found that saturated jute packing could carry

Presented at the Thirteenth Annual Distribution Conference, Memphis, Tenn., April 8, 1936.

moisture to the extent of 27 to 29% of its dry weight, with a change in volume of 40-45%.

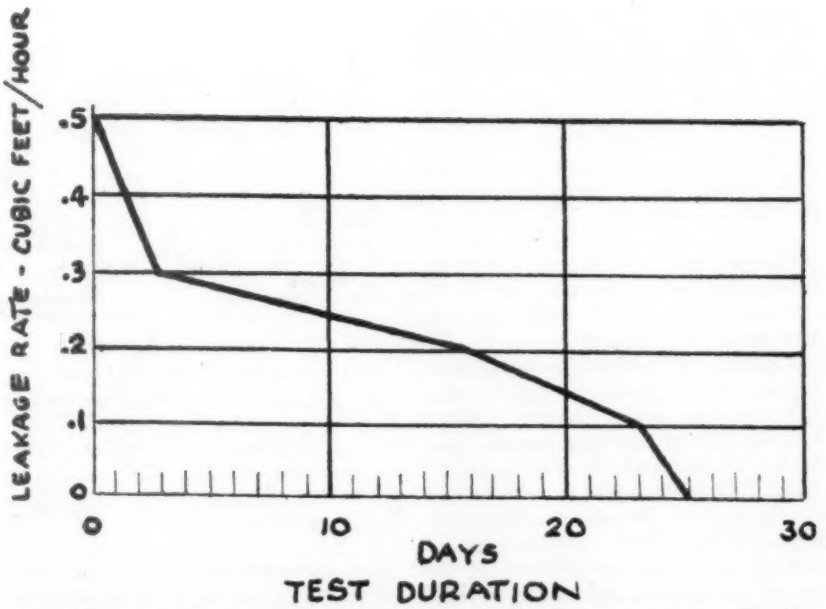
To remedy the conditions resulting from the use of dry gas, it was necessary to put back into the packing a reagent which would not only wet the fibers but would also cause them to swell, so they would occupy their original volume in the joint and completely eliminate all voids. It was found that in general the alcohols behaved like water in swelling the jute and that suitable blends of the poly-alcohols with tar and gum cutting agents had the required mobility and penetrating properties.

Our first important step was to simulate an actual joint condition. We cut out a section of pipe containing a leaking 4″ joint. This joint was set up in our laboratory and on test indicated a leakage rate of one-quarter of a cubic foot per hour. The leaks were evident at five points on the periphery of the joint. Immediately after the liquid reached the top, this joint was tight up to 2½ lbs. pressure. At this pressure from March 2nd, 1933, to August 14, 1933, it remained tight. On August 14, 1933, the joint was removed to one of our governor stations and connected at the prevailing gas pressure of 2 lb. per square inch where it has remained perfectly tight to the present time as indicated by soap and water tests made at frequent intervals.

Another 4″ joint was removed from a second district and set up similar to the previous test. This joint was in very poor condition and indicated a leakage rate of one-half cubic foot per hour at 6″ W.C. pressure. The leakage extended completely around the lead face of the bell and the spigot could be deflected in the bell with slight pressure. The joint was treated on August 22, 1933, with the following results:

Initial leakage rate August	22nd	0.5 cubic foot per hour
	25th	0.3 " " " "
September	7th	0.2 " " " "
	14th	0.1 " " " "
	16th	—tight

The joint remained under 6 inches water column pressure until December 4th, 1933, when the pressure was raised gradually to ½ pound. No leaks were evident. On December 13, 1933, the pressure was raised to 2 lb. and the joint still remained tight. Above 2 lb, two slight leaks developed, which stopped on reducing the pressure to 2 lb. again. This was a severe test for a joint in such poor original condition.



In addition to the foregoing work, many other tests were made on various sizes of joints and with similar results. We also determined to our own satisfaction that the liquid had no deteriorating effect on the materials of construction and this was substantiated by outside laboratories. Similarly deterioration tests on cement and rubber were carried on with negative results in both cases.

Incidental to our work we had occasion to determine the volume of gas leaking as represented by the bubbles formed through the application of soapy water. Ordinarily one would think that indications of bubbles in some cases convey the idea of tremendous leakage. We set about to determine what these bubbles actually meant in terms of cubic feet per hour. We determined that a bubble which forms about an inch in diameter and slowly expands to the breaking point, shows a leakage rate of about 0.012 cubic feet per hour. So you see that it takes ten of these bubbles to equal about one-tenth of a cubic foot per hour. Any leakage beyond this bubble leak rate we call a "blowing leak." Such leaks, of course, are, if in reasonable number, measurable with a test meter.

Distribution Conditions Resulting in Field Work:

Coincidental to our development work, a special case arose in one of our districts which was to prove an outstanding example of the effectiveness of the leak proofing treatment and justified its continued use in our properties.

Early in 1933 a section of 8″ main on M Street in our B district developed a leakage condition that covered a distance of about 2,100 feet. The leakage was evidenced through the presence of gas in a shallow duct system which was about 2 ft. from and parallel to the gas main. In attempting to locate the source of the leak the ducts were plugged between manholes in the usual manner, the manholes ventilated and tests run in each section. We found that the leakage condition was general, as all sections showed about the same indications. To check this result we then barred the entire length of main at intervals of 100 feet and confirmed the original finding. As this street had been paved with asphalt blocks only two years before, we did not wish to disturb it. Two openings 8′ x 3′ were made in order to determine the actual rate of leakage in a given section which fortunately had no active service connections. This test section was isolated and the following data is quoted to indicate the gravity of this particular case:

Length of main	260 feet
Size of main	8″
Number of joints	30
Corrected leakage rate for section	5.425 cu. ft./hr.
Average rate of leakage per joint	0.1808 cu. ft.
Bubble leak equivalents per joint	15.07
Leakage rate per day for section	130.2 cu. ft.
Leakage rate per year for section	47,523 cu. ft.

Great care was exercised in making this test and the method utilized is shown diagrammatically in Figure 2 in the Appendix.

This situation was obviously a difficult one. If leak clamps were to be placed, a total of 175 or more 5′ x 2′ holes would have been cut in the new pavement. We then estimated the cost of installing a two main system of equivalent capacity, one under each sidewalk, which, by the way, was paved with concrete and only 8 ft. wide.

To install a two main system, picking up the services enroute we figured would cost $13,655. Many construction difficulties would have been encountered as there are 8 street intersections on the north and south sides of the street, where lateral mains would necessarily be picked up, with interference from ducts, manholes, and other subsurface obstructions. The whole problem at this point did not present a very encouraging picture. To place bell joint clamps would have cost $5,077.

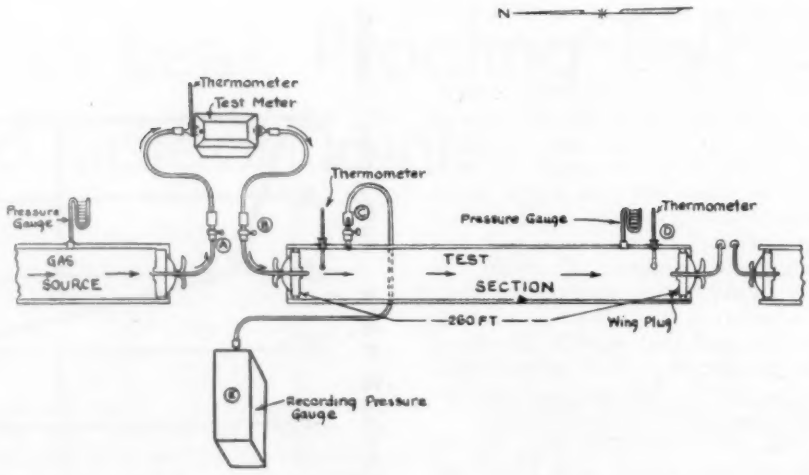


FIGURE 2

It was decided to test the efficiency of the Liquid Joint Treating Process under more convenient conditions on W Street in the same district and upon the results of this test pass decision on our M Street problem.

Accordingly, on March 6, 1933, a 1280 foot section of 4″ main which leaked at a rate of 5.25 cubic feet per hour was treated. Fortunately there were only 11 services on this run; they were shut off during the test. Two test joints had been previously uncovered. One leaked at five points on the joint; the other at two points. Two days after the treatment, both of these joints were tight and when the section was retested with a meter, the leakage rate was hardly measurable. It is now nearly three years since this initial treatment. The first joint mentioned above has been uncovered three times at regular intervals and the joint has remained tight.

The results of this initial test certainly justified the decision to treat the 8″ main on M Street. This treatment was begun on May 1, 1933. The liquid was introduced to the main through 3 services and through one main location which was fortunately available, at a point previously excavated for a leak. The input was continued from May 1st to May 10 and the liquid was recovered at the drips at intervals until May 17th. The liquid continued to run, however, for three weeks, a small amount being recovered each week. Three complete treatments were given the main in the ten days from May 1st to May 10th.

We removed the plugs from the duct system just prior to the treatment and then established 8 testing

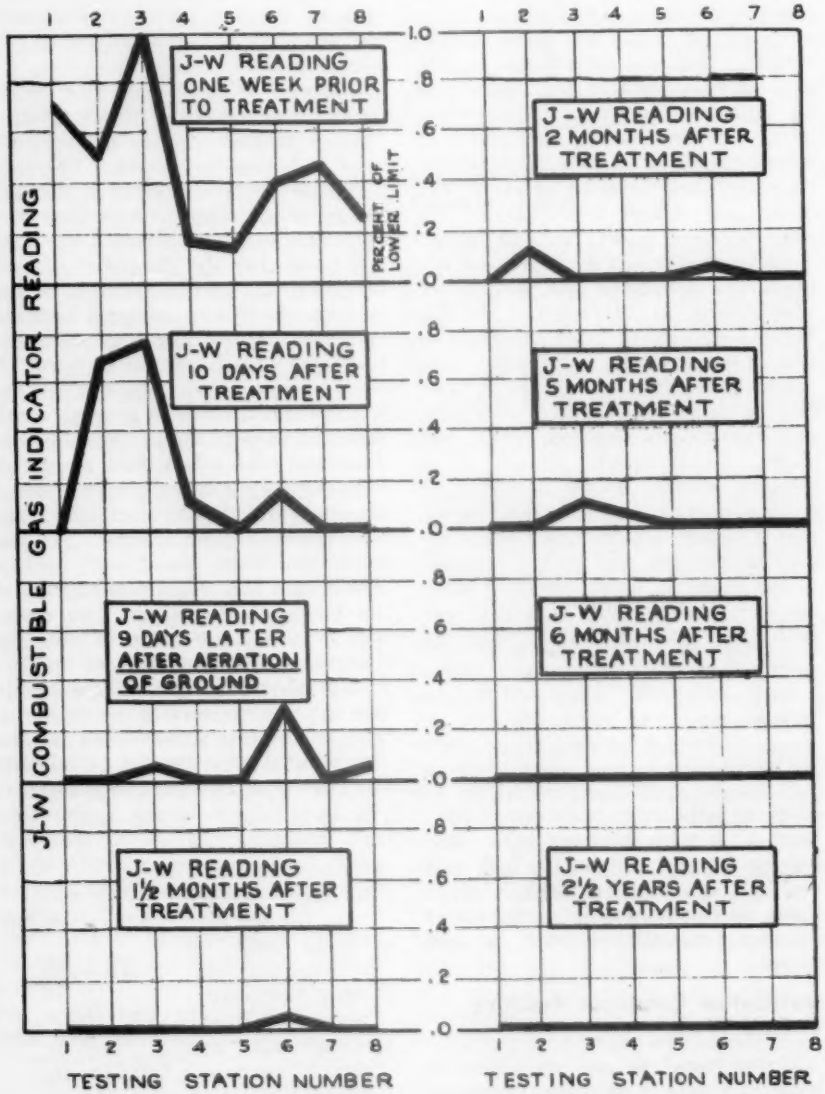

J-W COMBUSTIBLE GAS INDICATOR READING
PERCENT OF LOWER LIMIT
J-W READING ONE WEEK PRIOR TO TREATMENT
J-W READING 10 DAYS AFTER TREATMENT
J-W READING 9 DAYS LATER AFTER AERATION OF GROUND
J-W READING 1½ MONTHS AFTER TREATMENT
J-W READING 2 MONTHS AFTER TREATMENT
J-W READING 5 MONTHS AFTER TREATMENT
J-W READING 6 MONTHS AFTER TREATMENT
J-W READING 2½ YEARS AFTER TREATMENT
1 2 3 4 5 6 7 8
.0 .2 .4 .6 .8 1.0
TESTING STATION NUMBER
TESTING STATION NUMBER

FIG. I

stations, or every third manhole, in the area affected.

The tests made in the duct manholes, which you will recall were 2 feet from the gas main, are given in the following table and figure No. 1, both before and after treatment, the tests being made with a J-W combustible gas indicator.

As will be seen by a study of the foregoing table, the concentration persisted in sections No. 2 and No. 3 ten days after treatment. We confirmed this with bar hole tests made in these sections, which indicated soil saturation over practically the entire area along the main. It was at this point that we determined that the saturated ground was probably responsible for our continued indications and therefore decided to develop a method of clearing the ground of the residual gas.

On a previous occasion we had made a study to determine the volume of gas which could be contained in a cubic foot of average soil. The particular soil studied, a sandy loam, carried ⅓ of its volume in gas.

We began experimenting with a home-made ejector operated by air pressure. This was a very simple device as will be seen by reference to Figure 3.* In our original test of the device two bar holes 12 feet apart were driven on a paved street. Peppermint was poured into one bar hole and the ejector, or aerator as we now call it, was placed in the other. Within a few minutes the peppermint odor was discerned at the discharge of the aerator by several of our people who did not know what odorant had been placed in the test hole. We have proven that in our average soil, an area of at least 100 square feet per hole can be purged of gas by this method, making it an invaluable tool in leak work.

We applied this aerator to sections No. 2 and No. 3 over a distance of about 800 feet. An immediate improvement in concentration was shown after completion of the work, and nine days later, when tests were again made, the sections were practically free of any concentration worth mentioning. The aeration was then continued over the entire run and a considerable volume of residual gas was drawn from the ground.

During 1934 or about a year after this particular treating job, we had an opportunity to inspect 7 joints which lay at the intersection of "M" Street and "T" Street. A new steel 8″ main was laid crossing "M" Street at this point and our excavation lay parallel to the 8″ lateral spurs from the treated main. We carefully examined the joints extending from the C.I. cross which were exposed. All of the joints were tight and along the bottom side of two of the joints a slight moisture was present which adhered to the earth, forming a rather pasty cement against the face of the bell. Two of the joints on the lateral run to "T" Avenue were removed in the course of the construction. One of the joints was broken open on the job and the jute was found to be in two distinct rings. The ring in the back of the joint was thoroughly saturated with the treating liquid.

(*Continued on page 50*)

Test Manhole	J-W Readings one week prior to treatment	J-W Readings 10 days after treatment		J-W Readings 19 days after treatment	J-W Readings 1½ months after treatment	2 months after treatment	5 months after treatment	6 months after treatment	2 years 6 months after treatment
No. 1	.7	0	Aeration of soil began	0	0	0	0	0	0
No. 2	.46	.70		0	0	.13	0	0	0
No. 3	O.S.	.78		.05	0	0	.10	0	0
No. 4	.15	.10		0	0	0	.05	0	0
No. 5	.13	0		0	0	0	0	0	0
No. 6	.40	.15		.30	.05	.03	0	0	0
No. 7	.44	0		0	0	0	0	0	0
No. 8	.25	0		.05	0	0	0	0	0

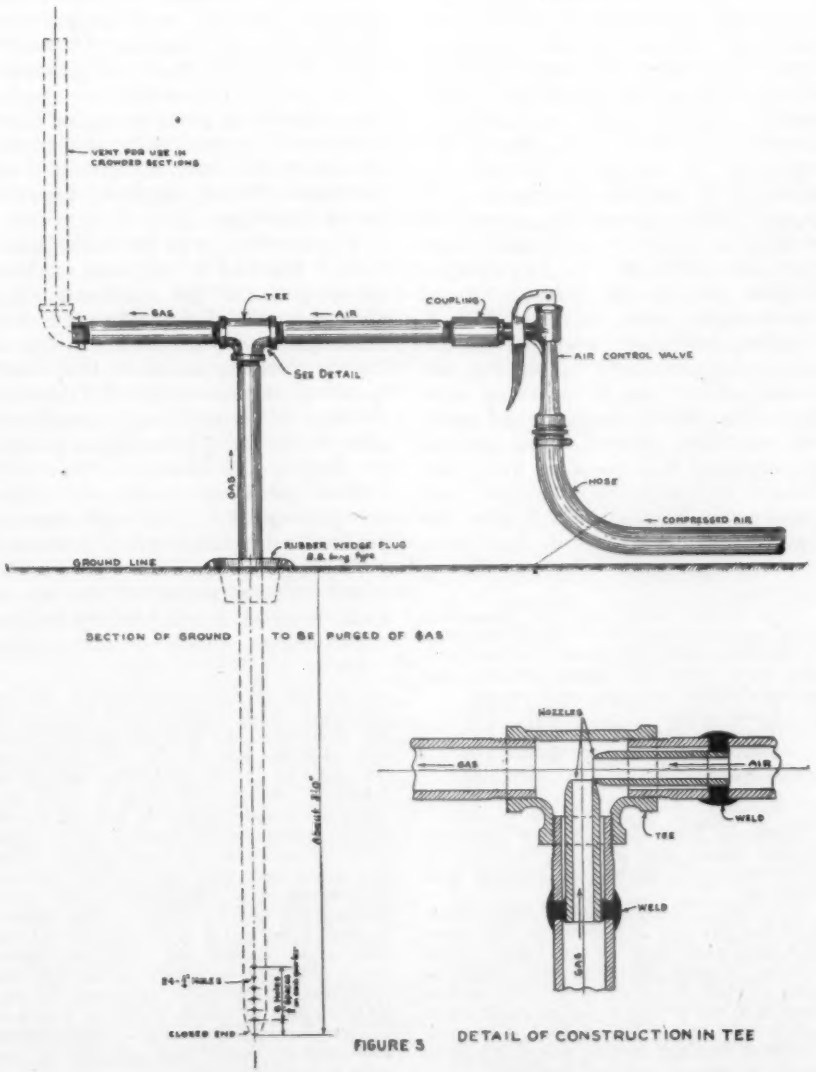


FIGURE 3 DETAIL OF CONSTRUCTION IN TEE

** Since writing this paper Mr. Hitz has developed an aerating device which is a decided improvement over the unit illustrated herewith. Detailed description with illustrations will appear in the May issue.*

Domestic Gas Utilization

Range Division—Part I—Continued

What the Market Offers

By
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Porcelain Enamels

One of the most curious records in human history is revealed by porcelain enamel. Exquisite examples of art (vases, medallions, jewelry) have come down to us from thousands of years ago. Through the ages permanence has surrounded the base metal of these enduring *objets d'art* by a coating substance that is flintlike in hardness, that is nonporous and durable keeping out moisture and air, that retains the original lustre and vividness of color. Thus, we have eloquent testimony that the craft of applying a thin artificial rock-like surface to a metal has been practiced for centuries. Not until shortly after the War were all-porcelain enamel stoves offered to the American public, and yet the commonness of porcelain is such that most salesmen in demonstrations today scarcely mention its sterling worth. And despite this, well over two-thirds of the stoves now in use, gas or otherwise, are not all-porcelain enamel—a probing into elementary facts seems to be much in order.

We view in awe the grandeur of the Grand Canyon and Glacier Park, natural in unfaded color "since man's memory runneth not to the contrary." Fundamentally, porcelain enamel, too, is a rock or glass-like substance applied by man to the exterior of some metal, usually either cast iron or steel. From the four corners of the world mineral substances[7] are gathered to be mixed and smelted in excess of 2200° F. (a volcanic heat), the pourings from which are plunged into cold water. The resultant tiny rocks are ground in ball mills to a measured fineness into so-called frit which is shipped to range manufacturers as the basic material from which porcelain enamel is made. Of first importance is to observe that porcelain enamel, unlike paints, lacquers, varnishes, japans, "japolac" and special low temperature vegetable preparations even of the baked-on variety, is essentially an *inorganic compound* similar to glass or rock and therefore not *visibly affected by oxidation* within the temperature range of from below zero to over 700° F. Coating materials, such as japans, are not as resistant to drying out, flaking off or wear in a manner similar to the lasting durability of genuine porcelain enamel. The process of applying this so-called frit commences first with the selections[8] and cleaning of the metal itself after the same has been formed in dies, holes punched and such other machining performed as is necessary. Manufacturers with good technique are painstaking in removing all surface impurities such as oils, dust, rust from sheets and in addition foundry sand from cast iron. The cleaning of sheets is usually accomplished chemically by immersing in a hot cleaner solution followed by a water rinse after which sheets go through an acid pickling vat (either hydrochloric or sulphuric) following which the sheets are washed in water and plunged into a neutralizing tank (soda ash and borax), then washed again and dried. In these operations close temperature and time control are essential in addition to the maintenance of proper bath acidity and alkalinity free from accumulated impurities. Drying must be rapid to avoid rerusting.

The application of the frit in liquid form,[9] effected by the use of hand spray guns to the spotlessly clean sheets, is one of the industry's most tenacious problems. The nature of the application is such that hand spraying is unavoidable. However, the first or ground coat is usually applied to the sheet by a simple process of dipping the same. Certain prescribed thicknesses and uniformity are prerequisite to a well finished product. Unskilled labor employed in the application of enamel over the metal surface, either by the dip or spray method, is attended by serious consequences which is particularly

[7] *One naturally supposes that each of the many enamel effects achieved today requires a different compounding of raw materials—this is true. The principal ingredients are: borax, one of whose sources is from the deserts of California; cobalt and quartz from India; soda nitrate from Chile; cryolite from Greenland; feldspar, soda ash and numerous metal oxides and special clays gathered from many quarters. Good raw materials are costly but unfortunately low grade products resulting from inferior raw materials are difficult to detect except by the expert.*

[8] *The proper metal base for enamelling is of supreme importance. Prof Andrews of the University of Illinois, in his excellent book "Enamels," states that the composition limits (%) of cast iron are:*

Total carbon	3.25 — 3.60
Graphitic carbon	2.80 — 3.20
Silicon	2.25 — 3.00
Manganese	.45 — .65
Phosphorus	.60 — .95
Sulphur	.05 — .10

Variance from these rather narrowly defined limits will lead to most of the nightmares of blistering, crazing and chipping.

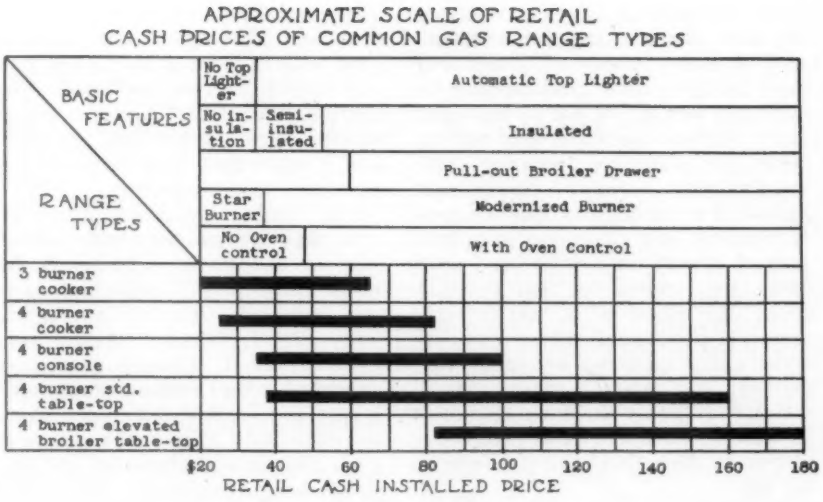
To take a good enamel, steel sheets must be very low in carbon, in fact, commercially pure iron of less than 0.20% carbon. Severe blistering will result if these conditions are not met. The carbon content is not so important on those parts which take only a ground coat of enamel. Surfaces that are slightly rough are preferable to smooth polished surfaces.

[9] *One of the biggest advances in the technique of enamelling was made with the discovery of "floating agents" such that with the use of clay and water the frit could be applied as a liquid instead by "shaking" the powder on dry. Clay and water are usually added to the frit by the range manufacturer together with some color preparations and opacifiers. The clay must have very high characteristics, particularly as to cleanliness, if light color finishes are to be obtained. The enamel in final liquid form is referred to in the trade as an "enamel slip." The importance can readily be perceived of having the coefficient of the metal base and the finished enamel as nearly equal as practical so that the resultant enamel will expand and contract under heat changes at the same rate as the metal.*

true in that the manufacturing investment in material and labor, principally the latter, up to this point of the process has been considerable.

The steel material properly prepared and covered with the ground coat is introduced into a drier to drive off moisture following which operation the black edge or stipple is sprayed on. The material is then transported by an overhead conveyor into a furnace having a temperature at some designated point (varying according to the enamel slip, the part thickness, the shape, and other factors) between 1500-1600° F. Under these heats the metal becomes red and the enamel material melts into a sticky paste in such a manner that the metal and enamel partially intermingle causing what is known as a penetration or an actual merging of the metal and enamel. A very delicate balance must be maintained between the furnace temperature, the melting point of the slip and the degree of liquidity to which the enamel progresses.[10] Furnace atmospheres free from dust and dirt particles as well as sulphur fumes are imperative, especially if a white finish is desired.

The ground coat and edge having been baked on, the pieces are removed from the furnace, then sprayed with the first finishing cover and sent through the dryer to expel moisture which otherwise would cause a surface blistering. Before going to the firing furnace each piece is subjected to a brushing or "wiping" operation[11] by which that portion of the finishing cover over the black edging is mechanically removed. The first finish cover is then subjected to furnace temperatures of about 1550° F. in which the first cover and the ground coat are fused together. The same general process is repeated in order to apply the second and final enamel cover. Modern practice dictates that a ground and two finishing coats are necessary to obtain good adherence and coverage on steel sheets.



This simple word picture of the rudiments of enamelling stove parts is, of course, too sketchy to convey anything other than a rough idea of the procedure. One elementary fact, however, should stand out clearly, namely, that enamelling is an expensive process[12] requiring substantial outlays of capital, the use of good raw materials and technically expert handling. In fact, there are few organizations in this country adequately equipped and disposed to manufacture sound enamel despite the numerous "ham and eggers" palming off what has all the exterior appearances to the public of a genuine rock-like enamel that can "take it." The practical benefits to the purchaser of suitably enamelled ranges are manifold among which are:

1. CLEANING is made a simple and quick operation.
2. APPEARANCE is advanced by affording colorful and lustre retaining surfaces in sharp contrast to the old dingy looking apparatus.
3. ODOR ABSORPTION is eliminated.
4. RUST PREVENTION adds appreciably to the life and usefulness of the equipment.

Salesmen stressing these obvious advantages of true worth will reap dividends.

Being basically similar to the enamel on sinks or bathtubs, the care of the enamel stove by the owner introduces no difficult problems. Rubbing to remove dirt can do no harm provided severe abrasives are avoided. Plain soap and water ordinarily suffice but occasionally a common cleaning compound is advisable to remove gummy grime. Cleaning can be more easily accomplished if accumulations are removed daily. The high temperatures even of broiling heats at 550° F. will never harm the clean enamel inasmuch as the frit itself was literally welded to the steel in the furnace at 1550° F.

Retail Prices

The scale of domestic gas range prices extends from twenty dollars ($20.00) up with the customer, thanks to competition both within and from without the industry, getting pretty much in accordance with the price paid. As with automobiles in the low price field the market offers to those of limited means gas ranges that serve the purpose but nevertheless with distinct sacrifices in convenience, capacity, beauty, and economy. Equipment costs[13] below sixty dollars ($60.00) generally involve serious concessions to either monthly operation costs or to cooking capacity. The fur burner range with insulated oven, broiler, and heat control is generally regarded as the minimal standard as to requisite fea-

[10] *The composition of the enamel slip must be carefully regulated in order to have the proper fusion temperature. Likewise the designer must make well-rounded corners and refrain from too sharp sloops on surfaces to prevent a running off of enamel at furnace temperatures, thus leaving a thin coating. Color matching, particularly of whites, is an element of the technique requiring the closest attention to details.*

[11] *Wiping of the edges of doors, panels, etc., is instrumental in retarding chipping that would occur if the finishing coats were allowed to extend to the edges of the sheets or around bolt holes.*

Due to the relatively small number of cast iron stoves now sold no description has been included here. The cleaning, application, etc., has much in common with the enamelling of steel.

[12] *The creating and packing of enamel ranges has presented no small problem to shippers. Although enamel will withstand a great deal of rough abuse, shippers have sustained costly replacements from "freight-house handling" tactics. This item of expense is being continually reduced through better enamelling and crating, as well as improved railroad treatment.*

The Porcelain Enamel Institute, Inc., Chicago, has produced a colorful and picturesque brochure which aids much in visualizing this process.

[13] *Equipment referred to herein is calculated upon the range cost of f.o.b factory plus 66 2/3% and $2.50 for installation (a 44.75% discount) as being substantially representative of the industry, although the margin of gross profit varies widely, according to local conditions and other factors.*

tures for normal family housekeeping use. Many ranges are currently sold without benefit of these ordinary facilities thus handicapping the customer in the full use of a gaseous fuel. Most observers are of the belief that weighing operating costs, serviceability, and depreciation against the original cost that the most economical gas range to purchase, judged strictly on a dollar and cents basis, lies within the $80.00-$95.00 scale. In excess of $95.00 the customer is purchasing added comfort, style, extra capacity, increased ruggedness and general quality, all of which [14] is highly desirable and most of which constitutes value received—that is, to those that have the "wherewithal."

To aid in securing a quick view of gas range prices the accompanying diagram is included to show the approximate prevailing scale for the general types of ranges and their commonest features. Nationally speaking the so-called "four burner standard table top" is the most popular type in from a 36" to 38" overall width. There are many difficulties encountered in comparing gas range retail prices with equipment using other fuels due to varying accessories and capacities. For instance, neither solid nor liquid fuel equipment carries either the thermostat or automatic lighter. A half hour spent in a competitor's store will establish that the average oil stove slightly "shades" the gas range price installed although in comparable quality and feature groups there is no appreciable difference on an installed basis. The coal range prices generally exceed those of gas by a wide margin although the modern trend is toward gaudy enamels and cheaper costs and poorly diminished equipment life. The electric range due to the extra cost of switches and top elements is far in advance of gas range prices even with combination oven-broilers, reduced top cooking capacity and the local power company absorbing a $25.00-$40.00 installation cost. Due to volume-production methods, wide acceptance and inherent advantages of the fuel itself, the gas range, other things being equal, has the "original cost" element well in hand.

[14] *There are numerous accessories generally available for use on a gas range adding appreciably to the utility, comfort and convenience of the operator, a partial list of which follows, together with the approximate scale of prices, depending upon the make:*

Deep well	25—	$40.00
Oven safety pilot light	7—	11.00
Flue detector	0.50—	4.00
Griddle top	3—	8.00
Special metal broilers	4—	6.00
Burner "cover-alls" (enamel)	1.50—	6.00
Monel metal top	30—	40.00
Electric light bracket (uninstalled)	4—	12.00
Minute minder	4—	7.00
Automatic "time-temperature" control	33—	45.00

(Continued in May issue)

APPROVAL REQUIREMENTS COMMITTEE TO ACT ON VITAL NEW AND ALTERED STANDARDS

When it convenes at the Cleveland Testing Laboratories late this month for its regular spring meeting, the A. S. A. Sectional Committee, Project Z21, A. G. A. Approval Requirements Committee, will consider an unusually wide variety of items of importance to the gas industry. The committee will take final action in endorsing several new or revised standards scheduled to go into effect January 1, 1937. In addition, certain new rulings regarding committee procedure, development of additional standards, etc., will probably be passed. The 2-day meeting is tentatively listed for April 23 and 24. The body itself is the central and final authority on matters pertaining to all the various approval, listing, and installation standards employed by the American Gas Association Laboratories in carrying out its certification program, and counts upon its roster not only a large well-balanced list of gas utility and equipment manufacturing company executives, but representatives of all interested governmental agencies, consumer groups, and national contracting, safety, architectural, and insurance associations as well.

In the line of developing new standards, the Approval Requirements Committee will consider for final adoption new Approval Requirements for Gas Hair Dryers. These were developed last year by a specially appointed subcommittee. It has been said that the standards offered constitute one of the most complete and authoritative first set of standards for a new type of appliance yet formulated. Extensive research at the Testing Laboratories, hearty cooperation and comment on the part of the gas industry, and several subcommittee sessions, have helped to bring these tentative hair dryer requirements to their present status.

The matter of drawing up approval standards for bake ovens, salamanders, and deep-fat fryers will also be considered at the forthcoming meeting. Hotel and restaurant ranges have been tested and approved by the Laboratories for several years and several members of the industry have recommended that standards be prepared for bake ovens, salamanders, and deep-fat fryers so that the entire commercial cooking line of appliances might be tested and certified.

Extensive revisions to existing sets of important standards are also scheduled for adoption by the Sectional Committee. Since the November 8, 1935, meeting in Cleveland of the Subcommittee on Approval Requirements for Gas Space Heaters, comprehensive revisions to the space heater standards have been awaiting decision. Chiefly these concern matters of correlation of the space heater requirements with other approval standards and with the various American Standard listing requirements for gas appliance accessories. However, these do include numerous other minor changes including an increase from 65 to 70 per cent in the minimum heating efficiency requirement for vented space heaters rated at 20,000 Btu per hour or more.

As for central heating gas appliances, corresponding revisions of approval standards are to be submitted as a result of the subcommittee meeting of October 18, 1935, in Chicago, and subsequent meetings of its Cleveland Working Group. Here again many of the proposed changes cover matters of correlation between the boiler and furnace standards and other appliance approval and accessory listing requirements.

Revisions to water heater requirements due for adoption are not extensive, but are of sufficient importance to be recommended for approval for immediate application. One recommended revision will, if passed, require location of nameplates at points readily observable when the heater is installed.

Action on accessories will concern automatic main gas-control valves, relief valves, and semi-rigid gas tubing and fittings. Several revisions, for immediate application, adopted by the Subcommittee on Listing Requirements for Gas, Pressure, and Temperature Control Accessories and its Automatic Main Gas-Control Valve Subgroup by letter ballots during the past five months, will be considered in regard to corrosion and marking standards for automatic gas-control valves. Two revisions, one requiring a test to cover repeated connection and disconnection without the development of leakage, and another to recognize for listing only compression and flared fittings, will concern semi-rigid gas appliance tubing.

Finally the Sectional Committee will weigh the advisability of permitting and encouraging manufacturers of approved appliances to display the Seal of Approval on paper stickers, pasted temporarily on the front faces of new appliances in addition to the permanent Seal shown on the nameplate.

The Law of Gas Sale Contracts

By Leo T. Parker

Attorney at Law
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IT IS well known that every gas company official, manager and employee is confronted daily with important legal problems, and in the majority of cases contract law is involved. The faculty of solving these problems correctly frequently results in the saving of many thousands of dollars which includes payment of damages, lawyer fees and other associated expenses, not to mention the great loss of time and effort required when endeavoring to win ultimately a law suit passing through the many different Courts.

First, it is important to know that an expressed contract is one where the exact terms of the agreement are stated in so many words, and an implied contract is where the law *presumes* a promise on the part of one party to perform a service for the other party.

Obviously, an invalid contract may not be enforced by either party and, therefore, litigation of it always is unprofitable. Consequently, considerable trouble and expense can be eliminated by readers who may by reference to a definite legal rule distinguish an invalid from a valid contract.

It is important to know that the Courts have consistently held that a contract is valid and enforceable if (1) one party submitted an offer which the other party unconditionally accepted in detail; (2) neither party deceived, misrepresented, or exerted unlawful influence with respect to the other party to obtain the contract; (3) both parties agreed absolutely to perform a definite act; (4) both parties were of legal age and of sound mind when the contract was made; (5) both parties had proper authority to make the contract; and (6) the objects of the contract were lawful and not against public policy.

Also, the law is well settled that either party may legally cancel any contract obtained by the other as a result of direct or indirect fraud, misrepresentation, coercion, undue influence, duress, threats, or where the contract is made without proper authority of an employee, or while the latter is mentally deficient, intoxicated, under influence of drugs, or under legal age.

When Contract May Be Rescinded

The principle of the law is firmly established that all parties to a valid contract are bound to fulfill the precise terms of the agreement. The instant one party fails on this respect he performs a legal breach, and the other party has choice of doing either of these three things: (1) he may refuse to continue to perform his obligations of the contract and sue the other party for damages and profits equal to his financial loss resulting from the breach; (2) or, he may file suit and compel the other party to fulfill the exact terms of the agreement; (3) or, the parties may enter into negotiations and make a supplementary contract.

While we are on this phase of the law, it is well for readers to realize that when under ordinary circumstances a gas company breaches a valid contract the other party is entitled to recover damages, and may also rescind the contract.

On the other hand, it is important to know that notwithstanding a valid contract existing between a gas company and consumers by which the former agrees to supply gas to the consumers at a stipulated rate, any reasonable ruling adopted by the Public Service Commission, acting under authority of the state laws, is valid and enforceable by the gas company; and the gas company is authorized to terminate the contract without notice to the consumers.

For illustration, in Birmingham Gas Co. v. Sanders, 162 So. 531, it was disclosed that a Public Service Commission adopted a rule which provided that any utility may suspend service to a customer without notice in the event the instruments, contrivances or appliances used in the conducting, supplying, measuring or registering gas are altered or changed in any way "so as to cause such instruments, contrivances or appliances to destroy, alter, or prevent the registration of the service received, or if for any other reason the customer is receiving or about to receive the benefit of service without compensation to the utility for full amount of service rendered."

A gas company contracted to supply gas to a consumer. Later a gas company employee discovered that the consumer had an arrangement in connection with the pipes whereby the consumer was receiving or about to receive the benefit of service without compensation to the utility. The gas company immediately and without notice to the consumer cut off the service. The consumer filed suit against the gas company on the grounds that any rule adopted by a Public Service Commission authorizing a utility to discontinue service without notification to the consumer is void. However, the higher Court held the ruling valid, and said:

"We have no criticism to offer of the rule. Its promulgation seems a valid exercise of the power vested in the said Public Service Commission."

Ambiguous Contract Construed

When interpreting an ambiguous contract the Court always inquires into the original intention of the parties. When a written contract is clear and unequivocal, its meaning must be determined by its contents alone; and a meaning cannot be given it other than that expressed. Hence words cannot be read into a contract which import an intent wholly unexpressed when the contract was executed. Moreover, where the contract evidences care and time in its preparation, it will be presumed that its words were employed *deliberately* and with intention.

For example, in Wood v. Ozark Co., 46 Pac. (2d) 614, it was disclosed that a man named Wood owns a large number of shale gas wells. The gas comes from these wells at a low pressure. When the gas from the wells is turned into the pipe line, if the pressure in the main is greater than that from the well, the gas from the well will not flow into the main. The more gas the main is furnishing to consumers the lower the pressure.

A gas company entered into a contract with Wood and purchased gas for distribution to its consumers. The contract provided that Wood

could cancel the contract if the working pressure in the meter through which the gas company was taking the gas exceeded 24 pounds for 60 days, unless the buyer remedied the condition before expiration of 30 days' notice.

It seems that for a period of 60 days the average working pressure in the main line of the gas company had been maintained at more than 24 pounds; that Wood had called this condition to the attention of the gas company and the probable cause of it; that no response had been made by the gas company to this letter. Later Wood notified the gas company that he would cancel the contract.

During the trial it was shown that the pressure was kept below 24 pounds for 30 days, after the notice was given; that for 60 days the pressure had been maintained at more than 24 pounds. The lower pressure was caused by the consumers using an unusually large quantity of gas.

Wood argued that the lowering of the pressure in the main after the notice was served was not due to anything done by the gas company but was due to the fact that the pumping plant of the city required an unusual amount of gas, causing more gas to run through the main, resulting in a lower pressure, and that although the pressure actually was decreased after his notification had been received yet since the gas company had done nothing to cause the pressure to be lowered, he had a legal right to cancel the contract. In refusing to permit Wood to cancel the contract, the Court said:

"A contract must be construed as a whole, and the intention of the parties is to be collected from the entire instrument and not from detached portions, it being necessary to consider all of its parts in order to determine the meaning of any particular part as well as of the whole."

Penalty Clause Void

Another important point of the law is that various Courts have held that the measure of damages recoverable against a person or company, for failure to fulfill the terms of a contract, is the actual loss sustained by the other party.

Also, the rule of law is well settled that a provision of a contract, which undertakes to fix a penalty, as liquidated damages for the breach of a contract, is void, if the actual damages which the complaining party suffered are susceptible of proof. In other words, a contract always is void where any party is required in a contract to pay a *predetermined* amount of damages, if it is possible to determine the exact amount of damages.

For illustration, in Home v. Robinson, 40 Pac. (2d) 637, it was shown that a consumer entered into a contract with a gas company by which the former contracted to purchase a large quantity of gas. The contract also contained a clause by which the consumer guaranteed that if he failed to fulfill the terms of the contract he would pay the gas company a certain sum as liquidated damages.

The consumer failed to use and pay for the gas and the gas company filed suit to collect the amount which the consumer had guaranteed to pay as liquidated damages. Although the lower Court held the consumer liable the higher Court reversed the verdict, saying:

"A provision of a contract, which undertakes to fix a penalty as liquidated damages for the breach of a contract . . . is void, if the actual damages which may be suffered by the seller through the breach of the contract are susceptible of proof."

Kinds Of Guarantees

Guarantees of the quality of merchandise, workmanship, and the like are a common source of legal controversy. Therefore, it is advantageous that gas company officials may know that guarantees are classified by the Courts as being "expressed" and "implied."

An expressed guarantee is one where the purchaser and the seller orally or in writing agree to the exact quality of merchandise. An implied guarantee exists where the seller does not actually make a warranty, but the circumstances are such that a Court will imply that a guarantee should exist. Frequently an agreement is such that a purchaser is compelled to rely upon the honesty of the seller and under these circumstances the Courts imply a warranty on the part of the seller that he will supply merchandise or equipment reasonably worth the price paid.

This law, however, does not prevail where the seller gives an expressed guarantee, or where he clearly states that no implied guarantee exists.

For example, in Manglesdorf v. Pauls, 273 Pac. 253, it was shown that a clause in the contract stated:

"We give no warranty, expressed or implied."

Later the purchaser decided that the merchandise was not of the quality which he had ordered and he filed suit against the seller for damages. The lower Court promptly held that the above mentioned clause resulted in the implied warranty rule being void, and that under no circumstances could the purchaser complain of the quality no matter how poor it was.

No Breach Apparent

Frequently contract relations become complicated and unusually difficult to interpret. However, common sense has much effect in correctly construing a contract, irrespective of its complications.

For illustration, in Derby Oil Co. v. McPherson Gas Co., 46 Pac. (2d) 872, it was disclosed that in December, 1927, the McPherson Gas Company acquired a franchise to construct and operate a gas plant and distributing system in the city of McPherson. In 1929 the gas company constructed a distributing system and has since that time furnished gas to the city for industrial use, for the use of the city, and to the private consumers in the city. The gas company's franchise was not exclusive. The city reserved the right to construct its own distributing system, or to grant other franchises to other companies, and it might terminate the franchise by purchase of the plant of the gas company.

Early in 1932, the city opened negotiations with the gas company for lower rates (probably due to the discovery of natural gas in large quantities in the area surrounding the city). The gas company did not respond. The city took various steps looking to establishment of its own system, and on March 17, 1932, entered into a contract with the Hutcherson Pipe Line & Gas Company, whereby the Hutcherson Company bound itself to construct a pipe line for transmission of gas from the near-by gas fields to the eastern limits of the city. The city agreed to buy all of its natural gas requirements from the Hutcherson Company. The Hutcherson Company owned no gas production and contracted with the Derby Oil Company for all of the Hutcherson's requirements in complying with its contract with the city. Both contracts between the city and the Hutcherson Company and between the Hutcherson Company and the Derby Company provided for a minimum purchase of one hundred and fifty million cubic feet of gas per year. The contract between the city and the Hutcherson Company provided the city would purchase from this company all of its natural gas require-

(*Continued on page 56*)

Galvanized Tank Corrosion On Automatic Water Heaters

PART I

A. F. Craver
Engineer, The Cleveland Heater Co.

OF ALL the factors involved in determining the life of a water heater, the one most generally considered is the storage tank itself. Mechanical difficulties with various operating assemblies can be taken care of with comparative simplicity, but failure of a tank means the dismantling of the entire heater to make replacement.

The rusting of and the failure of tanks and boilers due to corrosion has long been a troublesome factor to the hot water heater user. To date, there is very little constructive information of a practical nature which one can apply to this type of corrosion. Water heater storage tank corrosion expressed in dollars and cents of yearly loss would be astounding. It is impossible to give an accurate cost figure, but yearly replacements alone on these tanks may reach as high as two per cent, an appreciable waste whose retardation or elimination would become a total asset.

It is a conceded fact, that the main cause of corrosion is the action of oxygen on the metal. To effectively eliminate this condition would require the use of a deactivator whose cost is naturally prohibitive on small heating systems. The use of copper throughout the entire system will practically give a life time unit. However, the cost of an entire copper storage heater is about two times that of a galvanized or steel unit and considering the fact that ninety per cent of all storage heaters sold are of the galvanized steel type, the corrosion affecting these galvanized steel tanks is an engineering problem to be well considered.

Tank corrosion, therefore, becomes a highly important matter. Upon the thoroughness with which the manufacturer studies the causes of corrosion and develops methods and means of eliminating those causes will depend the service that will be rendered by the storage tank.

Four years ago, the writer initiated a research for the purpose of studying this problem. It was felt that if theoretical knowledge could be applied in a practical manner, a way might be found to eliminate or at least retard this corrosion. Laboratory tests seemed to prove that this corrosion in the common galvanized steel automatic storage heater could be retarded.

After all, laboratory tests are one thing, and tests made over a long period of time under actual consumer operation is another. The latter is, of course, the bona-fide or acid test, which really proves the practicability of the theory. A problem may be solved theoretically, but if it doesn't work practically, what good is it?

Laboratory tests showed that the major factor of corrosion was due to electrolysis. If this electrolysis could be eliminated it was felt years of life would be added to the tank. After a year's research in the laboratory, a method was developed which seemed quite satisfactory. This method was then applied to production heaters to be put into actual field service.

Now that we have been able to watch this laboratory application on heaters which have been in actual consumer service from two to three years, we can say the following: In territories where storage tanks were previously being penetrated in about three or four years by corrosion, several tanks were cut open and inspected after three years' continuous operation. "Not one tank showed a single spot of corrosion or rust." Replacement on leaky galvanized tanks in service the past three years has been reduced to practically nothing.

In the consideration of the causes of corrosion, we find after a little investigation that corrosion itself is so wide in its scope and its varying factors which singly or collectively cause corrosion, that it would be quite impractical to more than briefly touch upon the more important factors. Causes of corrosion may be divided into three general groups—simple deterioration, contact corrosion and external corrosion.

Simple Corrosion

There are several factors which produce tank corrosion. Any metal, iron included, when placed in water, is subject to a force which tends to cause it to go into solution, with the formation of ions (a minute charge of electricity). When iron goes into solution in water, a chemical reaction also takes place, which results in the liberation of free hydrogen gas and the formation of a ferrous oxide. In other words, a small particle of iron (Fe) unites with a part of the oxygen (O_2) in the water, in accordance with the following chemical change:

$Fe + 2H_2O$ (water) $=$ $Fe(OH)_2$ (Ferrous Hydroxide $+$ H_2 (Hydrogen).

Ferrous hydroxide, being very unstable in the presence of oxygen, will again change either to the more stable reddish brown rust ferric hydroxide, $Fe(OH)_3$, or to the black ferrous oxide, FeO, which is not so stable:

$2\ Fe(OH)_2 + \frac{1}{2}\ O_2 + H_2O =$ $2\ Fe(OH)_3$ (Ferric Hydroxide).

$Fe(OH)_2 + H_2 + \frac{1}{2}\ O_2 =$ FeO (Ferrous Oxide) $+$ $2H_2O$.

If the ferrous oxide is still further oxidized it will turn to ferric oxide (Fe_2O_3) a red rust:

$2\ FeO—\frac{1}{2}\ O_2 = Fe_2O_3$ (Ferric Oxide).

The oxygen, $\frac{1}{2}\ O_2$, is of course, the so-called free oxygen which will be found in all water, unless it has been forced out by various definite methods.

The reaction in the type of corrosion just discussed is analogous to the metal having been subjected to an acid solution. The acid solution is of course, more rapid in its action, but the same characteristics will appear as in the case where the metal is placed in water alone.

So, it is practically impossible to keep galvanized iron or steel from corroding when in the presence of water without the removal of all oxygen. After all the oxygen is used up then corrosion will practically cease. Where oxygen is being continually supplied by fresh water or aeration, naturally the corrosion will continue. "Some corrosion, therefore, must be expected on all iron water storage

vessels unless the contained solutions are de-oxidized."

External Corrosion

External corrosion may be classed as that resulting from outside influence such as stray currents, radio grounds, etc. The chief factors here involved are the peculiar and unique ways of dealing with these outside influences. These factors are not so important and will only be mentioned briefly later on.

Contact Corrosion

Contact corrosion may be classed as that corrosion resulting from the potential differences between unlike metals in contact with the same solution. This to our belief is the main factor involved. The electro-chemical theory greatly helps the explanation of this type. This is sometimes called "Galvanic Action."

By means of measurements all metals have been listed and arranged in an Electro-Chemical series. If none of these metals are affected by outside influence, they will tend to go into solution in the presence of water at rates of speed proportional to their position in the list. The metals at the top of the list show quick reaction or corrosion, the reactions retarding as the metals descend in order.

Potassium
Sodium
Barium
Strontium
Calcium
Magnesium
Aluminum
Manganese
*Zinc
*Iron
Cadmium
Cobalt
Nickel
Lead
Tin
Hydrogen
Bismuth
Brasses
Bronzes
Monel
*Copper
Antimony
Mercury
Silver
Gold

Note the position of Zinc (Galvanizing,) Iron and Copper.

Usually, any element will displace any other element lower in the series. Thus, if zinc were in contact with copper, and the ends of both submerged in water, the zinc would be expected to dissolve or go into solution, or corrode, quicker than would the copper. Hydrogen ions would plate out at the zinc or cathode and there would be a flow of current from the zinc to the copper through the solution. The electrical circuit would be completed by the flow of current in the opposite direction through the metal contacts.

It has also been erroneously believed that the current generated from this metal contact causes corrosion. "However, the current generated is the result of corrosion taking place and it is the metal potential difference which increases the action." If to the corrosion of simple deterioration is added the corrosion from metal contact, the total corrosion is greatly increased. Some figures show this to be as high as 75%. Again, although oxygen is the main factor of corrosion, other factors may enter into the reactions either increasing or decreasing the rate of procedure.

The galvanized storage tank of an automatic storage water heater with its brass and copper fittings, such as dip pipe and thermostat tube, is thus in reality a 4 galvanic cell, just as a wet type storage battery. In the latter the conditions are ideal for rapid corrosion of one electrode, thus producing intense current.

In the case of the heater storage tank the conditions are not quite so ideal for rapid corrosion, and the current is much less intense, but the reaction is similar.

This electrolysis, however small it may be when compared to a storage battery, none the less has the faculty of greatly accelerating other types of corrosion, the ratio being as much as 2½ times to 1.

The extent of corrosion can be determined by the loss in weight of the metals in solution. The following test gives a comparison between the corrosion difference of zinc, brass and copper. All metals were submerged in a salt solution of the same concentration which was renewed from time to time. Although this test is not very accurate and does not give any definite result, it does show the difference in the rate of corrosion between the three metals under the same conditions.

Metals submerged in solution.	*Grams loss in weight.*
1. Zinc and copper (Separated)	Zn. 0969—Cu. .0257
2. Zinc and copper (Connected)	Zn. .4780—Cu .0074
3. Zinc and brass (Connected)	Zn. .0894—Brass .0176
4. Zinc and zinc (Connected)	Zn. .0753—Zn .0791

(Samples of galvanized steel of approximately the same size and weight. Area of brass and copper the same.)

TABLE NO. 1

Notice the percentage of loss in the first sample and the difference as of sample 2 where the same metals are electrically connected. The electrolytic action has increased the corrosion of the galvanized steel by approximately five times and has decreased that of the copper by three.

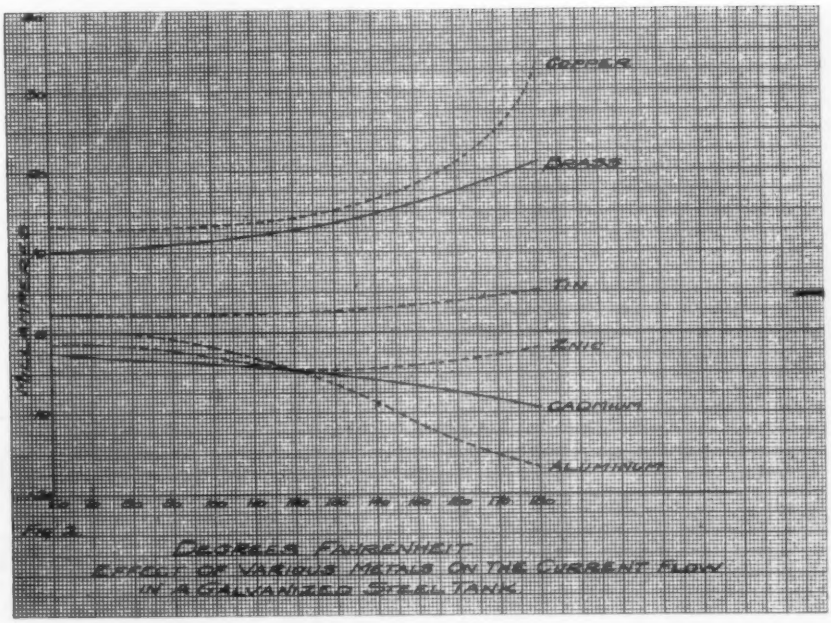
Galvanizing

The Electrochemical series at once tends to show why zinc is used as the galvanizer of iron. Zinc is slightly electro-negative to iron and will tend to go into solution or oxidize quicker than the iron. Zinc also makes a good galvanizer due to the inherent tendencies of the metal to easily and evenly attach itself to iron. Then again zinc oxide on being formed has a higher resistance to the elements than does iron oxide. Galvanizing under atmospheric attack may last indefinitely, however. Under submerged corrosion there are so many different affecting factors that its life depends entirely on the local conditions.

Galvanizing may be applied by one of four methods. The "Hot Dip Process," "Sherardizing," "Electroplating" and by means of a metal spray gun. The "Hot Dip Process" is the most common and probably the most practical from a boiler maker's production. Briefly—the black iron or steel tank is first pickled in an acid solution to dissolve any oxide or foreign material, then thoroughly washed, again immersed in another acid bath and then dried in an oven. The then clean metal is immersed into a flux bath and at once immersed in the vat of molten zinc spelter.

The zinc will alloy with the iron and form a microscopic protective coating. The Bureau of Standards is quoted as saying that one ounce of zinc per square foot of exposed metal (0.0017 inch thickness approximately) is satisfactory as a protective coating against corrosion. Most boiler manufacturers however go beyond these limits.

Galvanizing is a study in itself and also too long a subject to be given justice in this research. It will be considered that all galvanizing on the boilers examined is average and



represents average fabrication.

Potential Difference

In the average automatic storage heater today, the metal cold water dip pipe inlet is generally the largest surface offering potential difference. Many tests were made in storage tanks using different metal dip pipes. These dip pipes extend practically through the entire inside length of the tank. The various customary additional fittings such as thermostat tube, brass water connections, brass drain outlet, etc., were also included in the tank. These results are shown in Fig. 2.

The values in Figure 2 did not remain constant and only represent maximum conditions. At the first point of contact, the meter reading jumped to a maximum point. Then upon maintaining contact certain resistances appeared gradually reducing the current flow. Naturally, the maximum readings do not represent the average condition in the heater. They do show, however, certain tendencies and also possible conditions. It can be safely assumed that the results of tests shown in Fig. 2, prove that the current flow or electrolysis in the average hot water storage heater is of great importance. "Remember that the current flow is the result of corrosion."

Effect of Agitation in Corrosion

The selection of the right type and the kind of metal used in the dip pipe has some importance in the retardation of corrosion. The control of the incoming cold water is also of vital importance. When it is realized that a closed heating system has very little corrosion trouble and that the cold water inlet on a hot water heater makes it an open system with which they have a lot of corrosion trouble, the dip pipe becomes an important factor.

First, the type of the dip pipe should be one which delivers the water to the place least affected by corrosion and also one which causes the least agitation. Incoming cold water contains the soluble oxygen and oxygen still is the main factor in corrosion. When it is realized that the amount of dissolved oxygen present in the stored water at the start can account for only a small fraction of the total corrosion, it becomes obvious that the rate at which oxygen from the water is transmitted to the metal surfaces will be a determining factor. The solubility of oxygen in water is affected by several factors such as temperature, pressure and soluble salt concentrations. See Table 2, Figure 4.

Number of cc. of gas measured at 0° and 760 mms. which dissolves in 1 cc. of water at the temperature stated and when the pressure of the gas plus that of the water vapor is 760 mms.

GAS	0° C	10	15	20	30	40	50	60
Carbon Dioxide...	1.713	0.194	1.019	0.878	0.66	0.53	0.44	0.36
Chlorine	....	3.09	2.63	2.26	1.77	1.44	1.20	1.00
Hydrogen	0.0215	0.0198	0.019	0.0184	....	....	....	....
Nitrogen	0.0139	0.196	0.0179	0.0164	0.0138	0.0118	0.0106	0.01
Oxygen	0.049	0.038	0.034	0.031	0.026	0.023	0.021	0.019

TABLE NO. 2

Increase in the motion of the water influences the rate of corrosion. Such agitation mainly causes more oxygen to be brought to the surface of the corroding metal. Excess agitation is created by a poorly designed dip pipe that permits the incoming cold water to hit the bottom with such force that the water rebounds and sets up circular currents extending far above the bottom of the tube. On plain steel air agitation increases the corrosion rate as high as five times. Extreme agitation will also tend to wash off the protective film of hydrogen which is plated out during the corrosion process. Extreme agitation of the stored solution will also tend to loosen the protective coatings of alkaline salt and rust formations.

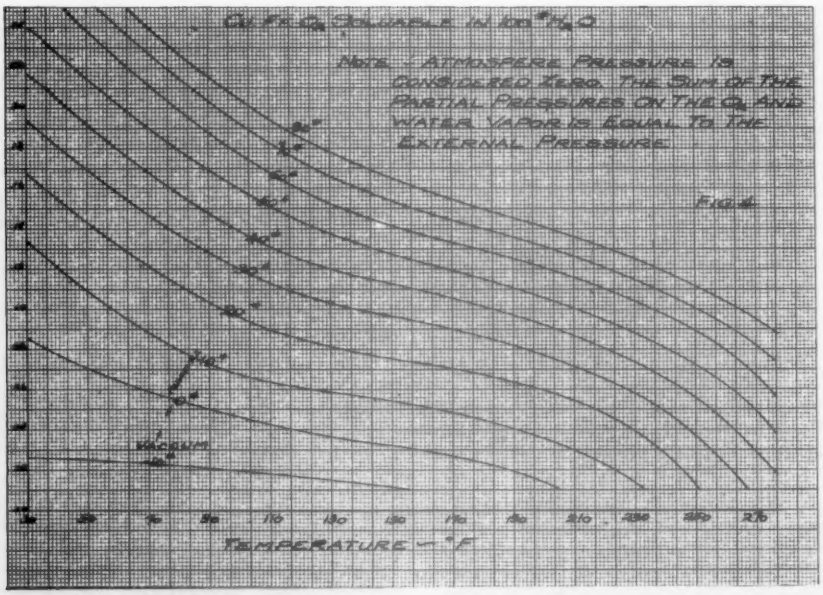
The number of draws made from the storage heater will, of course, affect the agitation factor. Short frequent draws are harder on the task than long draws coming less frequently. The more oxygen that is supplied to the corroding surface and the greater the movement of the water over this surface, all tend to activate the corroding condition. The temperature of the incoming water also affects the solubility of oxygen.

Agitation and water change is also caused by heating. Water upon its increase in temperature becomes lighter than colder water and tends to rise, causing a circulation of water currents. This circulation is greater in the side-arm type of heater than the under-fired type due to the flame concentration on a small volume of water and its method of delivery.

In the under-fired type the water is heated more gradually as the heater is applied to the whole tank at one time. This results in slower circulation of the heated water.

In determining the kind of metal to be used for the dip tube, the electrochemical series would seemingly be the deciding factor. That is, in order to reduce the metal potential difference to a minimum, metal similar to the tank should be used. For example, if a galvanized steel tank is to be used, then the dip pipe should also be of galvanized steel. On copper tanks, a copper tube should be used. Although the above would seem to be the theoretical answer, it was found not to be the practical answer in every instance.

Many tests were made on dip tubes composed of copper, brass, tin,


Note: Atmospheric Pressure is considered Zero. The Sum of the Partial Pressures on the O_2 and Water Vapor is Equal to the External Pressure.
Fig. 8
Vacuum
Temperature — °F

lead, zinc (galvanized), cadmium and aluminum. Referring back to chart No. 2, a copper tube gave the highest potential difference when placed in a galvanized boiler, the brass tube being somewhat less. A tin tube reduced the differential approximately 33 percent. Those metals above iron in the electrochemical series would naturally corrode quicker. Thus, on a galvanized cadmium and aluminum tube the polarity changes reversing the flow of current, showing that the dip tube is now going into solution instead of the steel tank.

A dip pipe made from metal which makes it the corroding medium is not a practical tube in a hot water heater. If there is a distinct potential difference between the tank and the tube, due to the small surface area of the tube in comparison with that of the tank, corrosion on the tube will be out of proportion to its efficient life. A dip pipe which goes to pieces in a short time will completely ruin the satisfactory operation of the heater unit. The tube may drop off, holes may occur in the hot water zone, all of which will deliver the cold water to the top of the tank instead of the bottom. Very little hot water capacity can be obtained with such a condition.

Temperature

Temperature has an important place in corrosion. It is a conceded fact that corrosion increases with the temperature rise. Referring back to Table 2 and Figure 2 the increase of temperature shows directly the increase of generated current and indirectly the increase of corrosion.

With the increase of temperature, water which holds oxygen in solution tends to liberate this nascent gas as hot water will not hold nearly as much oxygen as cold water. Consequently, when cold water coming into the boiler upon being heated gives off this absorbed oxygen. The hotter the water, the greater the quantity of nascent oxygen free to attack the corroding surface. Neither is the rate of oxygen liberation proportional. Hot water between 150° and 160°F. will liberate more oxygen than water between 130° and 140°F. The accelerating effect of temperature on corrosion in water is indicated in Figure 9.

The foregoing figure clearly indicates that in a closed system where the oxygen is held in the system, corrosion increases proportionately to the increase of temperature. In an open system, the oxygen or air will be allowed to escape, thus decreasing the corrosion rate. The average hot water storage system is a combination of both where the system is opened to frequent water draws. On some poorly designed tanks, it is possible for air pockets to form at the top of the tank. Wherever there are air pockets excess corrosion can be expected. Again these pockets generally form at the point of hottest temperature.

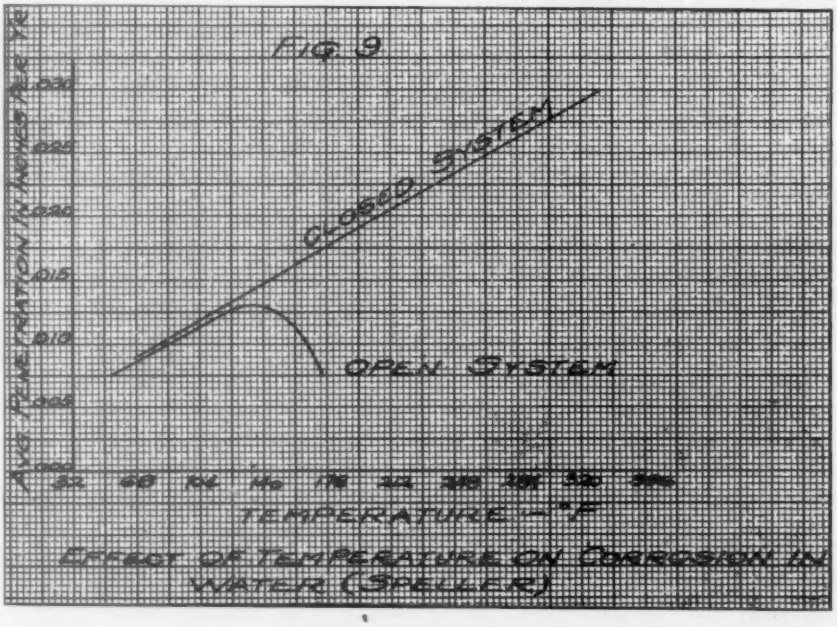
When initial corrosion starts, as mentioned before, the free oxygen unites with the liberated hydrogen, removing the protective coating and the excess oxygen is left free to attack the corroding metal. Increase of temperature also lowers the overvoltage of the hydrogen on the metal and facilitates corrosion by permitting the more rapid evolution of hydrogen gas.

Temperature also increases the electrical conductivity of the solution or the electrolytes, and in this way tends to produce greater localization of corrosion, resulting in pitting.

In under water corrosion, the products of corrosion usually contain about one-third ferrous hydroxide as the metal is not completely oxidized due to the lack of sufficient oxygen, and the rust is soft and more uniform in structure. Consequently this soft rust is more easily removed by increased temperature and by the velocity of the water rushing over it. After the rust is removed, it offers a new surface for corrosion attack.

"Temperature of Corrosion" or that temperature where corrosion is

(*Continued on page 56*)



Circulating Humidification Requirements

By O. J. Kuenhold

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IN a modern warm air heating plant, the size of the furnace and dimensions of ducts, registers, etc., are carefully calculated so that it is definitely known that the desired room temperatures will be attained under any weather conditions. No reliable heating contractor or engineer would think of merely making a wild guess at the required size of furnace ducts, etc., and yet this is the usual procedure with respect to the humidifying equipment.

It is common to see a splendidly engineered conditioned air heating plant, scientifically designed to the last detail—except as to the humidifying equipment. This is usually thrown in as an unimportant detail. And yet, it is humidification of the indoor air which gives to conditioned air heating some of its most important and most talked about advantages.

True, there is some excuse for this because practically no information has been available to enable the required size of evaporating equipment to be intelligently calculated. The following discussion aims to eliminate that excuse and it presents a simple but scientific method for calculating the evaporative requirements of any heating installation. The basic data included is the best available at the present time.

Outline

The problem of finding the required size of evaporating pan comprises two main calculations:

(1) To find how much water must be evaporated into the indoor air per hour or day during 35 degree weather.

(2) To find how much water per hour or day can be evaporated per square foot of water surface during bonnet temperatures prevailing in 35 degree weather.

In order to know how much water must be evaporated per day under the conditions given above we must know:

(1) How much outdoor air enters the heated space of the home through outdoor air intakes and by leakage at door and window cracks, etc.

(2) How much moisture must be added per cubic foot of incoming air to hold the room humidity up to the desired per cent.

In order to know how much moisture must be added per cubic foot of incoming outdoor air we must know the average prevailing outdoor humidity in grains of moisture per pound and how many grains of moisture per pound the indoor air contains when a practical and desirable per cent of indoor humidity is maintained.

When the above factors are understood and the simple rules for calculating them are applied, the proper size of evaporating pan can be intelligently determined and every humidifying installation can be made to function perfectly over the entire range of winter weather.

Why Air Leakage Determines the Rate of Evaporation Required

The air in homes is constantly changed by outdoor air leaking in upon the windward side, drifting across the house and escaping on the leeward side. If the humidity of the indoor air is raised so as to contain more water vapor per pound than the outdoor air, then the added moisture is constantly carried out of the house along with the escaping air on the leeward side; and the inleaking air on the windward side, which contains less moisture than the indoor air, constantly dilutes it and thus constantly reduces its humidity.

To offset this constant dehumidifying process and maintain the indoor humidity up to the desired percentage, moisture must constantly be added to the indoor air at the same rate per hour as the rate at which the moisture escapes.

Calculating Air Leakage

The hourly volume of outdoor air drifting through a house depends mostly upon how tightly the windows and doors are fitted. Infiltration through walls or other points than door and window cracks may be ignored in well built homes. The following table, if used with good judgment, will enable the volume of air leakage to be calculated with adequate accuracy:

AIR LEAKAGE TABLE

Door and window fit	Air changes per hour	Air leakage per running ft. of door and window cracks
Poor	2	60 cu. ft. per hour
Fairly good	1	30 cu. ft. per hour
Weather stripped	½	15 cu. ft. per hour
Storm windows	½	15 cu. ft. per hour

See instructions for use below

For houses of average size and construction, simply multiply the cubic feet of heated space by the estimated number of air changes per hour. For larger houses and those having an unusual number of windows, find how many running feet of window and outside door cracks there are *on the windward half of the house* and multiply by the estimated cubic feet of hourly air inleakage. The leakage given for storm windows assumes a fairly tight fit. It is also assumed that window frames in masonry homes have been well recaulked.

If there are outside air intakes these must be considered as they add considerably to the incoming air volume and hence to the required evaporation. For gravity circulating plants, a fair average assumption is 50 cubic feet of outdoor air coming into the house per square inch of intake duct area at its smallest cross sectional area. For forced air circulating plants, multiply the smallest cross sectional intake duct area *in square feet* by one-half the calculated duct velocity in feet *per hour*. (This assumes the blower turned on one-half the time).

If a garage room is heated by forced air circulation it will of course have no return duct. The air thus expelled from the house to the garage room is replaced by increased leakage unless an outdoor air intake is provided, as should be done, to replace the air expelled to the garage room. Similarly, if air is expelled to outdoors or attic from rooms which have no return duct connection, such as bathrooms, and kitchen, then air so expelled will increase leakage unless outdoor air intake duct area is provided to replace the expelled air. In calculating the volume of air expelled from certain rooms of the house through outlet ducts, assume that only about one-half the air sent to such rooms is expelled and also assume that the air blower is in operation half the time as it would be in 35 to 40 degree weather.

It is uneconomical to take outdoor air into a home except for replacing air that is expelled from the rooms that have no return duct connection. To take in more outdoor air than for such replacement is entirely unnecessary when the air is humidified. Normal leakage easily keeps the air fresh and humidification keeps it healthful.

In homes heated by return duct system, any moisture put into any rooms will be spread to all rooms by both recirculation and diffusion. In radiator heated homes, the moisture put into part of the rooms will be largely spread to all communicating rooms by diffusion. It is impossible to humidify one or a few rooms without humidifying the others more or less, unless they are completely shut off.

The foregoing has outlined a method of calculating the total volume of outdoor air which enters and replaces indoor air each hour. It assumes the moderate wind conditions which prevail during nearly all of the heating season.

What Indoor Humidity to Maintain

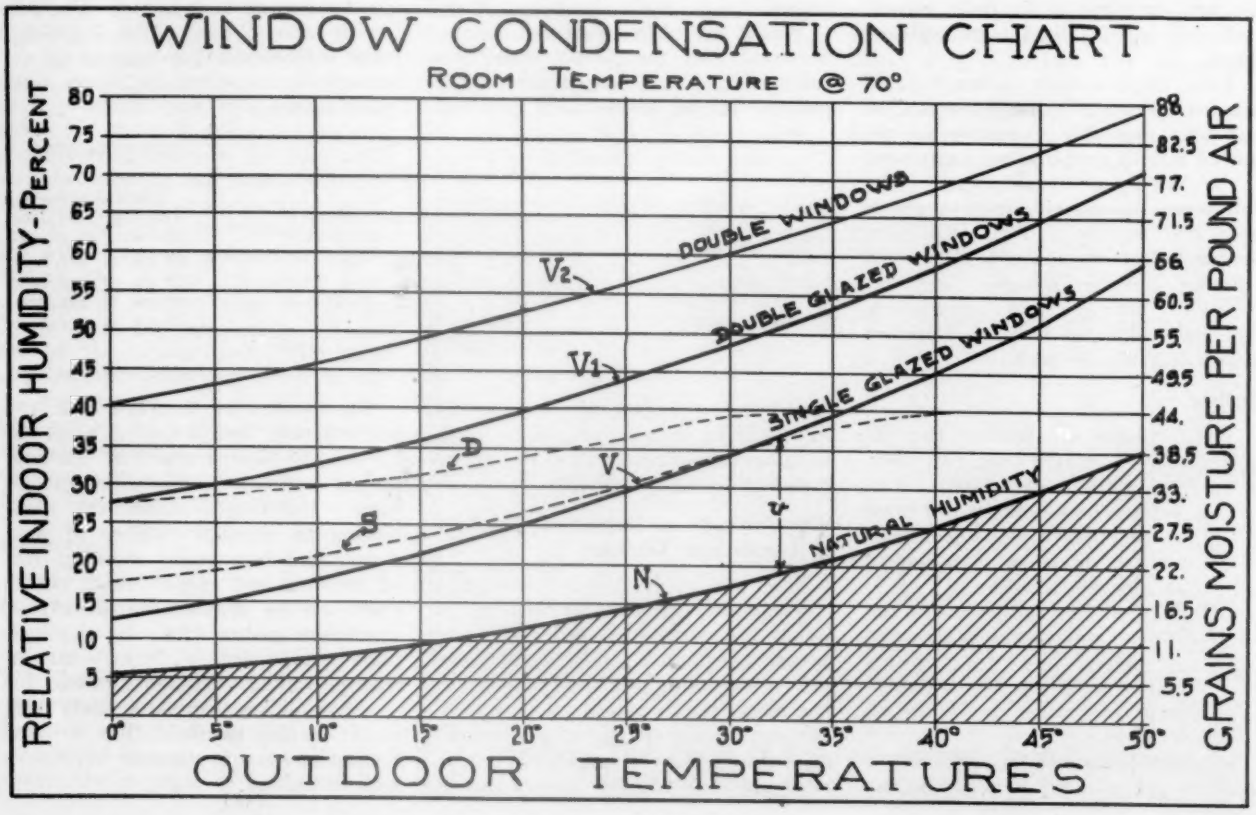
When we have determined the volume of outdoor air which enters the house per hour, we have the basis for determining how much water must be evaporated per hour to maintain desirable humidity. We shall next discuss what is desirable humidity and certain related factors all of which are best made clear by The Window Condensation Chart.

Chart

In the Window Condensation Chart the vertical lines represent outdoor temperatures from 0 to 50 degrees. Horizontal lines represent indoor humidities, given at the right in grains of moisture per pound of air and at the left in the equivalent per cent of relative humidity, when the room temperature is 70 degrees.

Curve N shows the indoor humidity that will exist during various outdoor temperatures, if no moisture is added to the indoor air from any source. This is called the "natural" indoor humidity. Note how the natural humidity gets lower as weather becomes colder. For instance, during 40 degree weather the indoor humidity will average 25 per cent or 27½ grains of moisture per pound while in 25 degree weather it will drop slightly below 15 per cent. Curve N shows an average, the variations of which are of no material consequence.

Curve V shows the per cent of indoor humidity at which window vapor begins to appear, on single thickness glass windows, assuming 70 degree room temperature. For instance, in 40 degree weather, va-



por will not appear until the room humidity has been raised to 45 per cent but in 20 degree weather, window vapor will appear when the room humidity has been raised slightly above 25 per cent. As the room humidity is raised an increasing per cent above the points shown by curve V, the vapor spreads over the window, then takes the form of water globules, and at about 5 per cent points higher than the points shown by curve V, the window condensation begins to trickle down. This is about the limit of practicable humidification for single thickness glass windows because at still higher humidity, the condensation becomes a nuisance.

It will be very apparent that humidity as high as 45 per cent can not be maintained during cold weather in homes having single glass windows, without excessive window wetness during such weather.

Curve V1 shows the window condensation results obtained if the windows have double glass panes with ⅛-inch air space in between. The indoor humidity can then be maintained about 14 per cent points higher before window vapor appears.

Curve V2 shows the window condensation results obtained when tight fitting storm sashes are added outside of the usual windows. In that case the indoor humidity can be maintained as high as 45 per cent, even in weather down to 10 degrees, before window vapor appears.

Other Important Points

So far we have considered the high limits of indoor humidity only from the standpoint of window condensation. There are, however, certain other important points to be considered. If the room humidity is maintained as high as 45 per cent during the more extreme winter weather, one's clothing will be humidified 45 per cent while indoors, plus the added per cent of moistness due to perspiration. Upon going outdoors, the water vapor contained in one's clothing will be almost instantly condensed into moisture and this gives a noticeable sense of chill when passing to the cold outdoor air. The effect is the same as going out into the cold with slightly damp clothing.

The maintenance of high humidity during extreme winter weather may result in wet spots on walls or ceilings, especially if the home is not insulated and, under certain conditions, slight not noticeable moisture condensation may be felt on furniture, especially on metal objects such as piano and bed frames. Because of these liabilities, home owners should not be encouraged to maintain high humidity during the colder weather.

Owing to the above, the indoor humidity should be maintained upon a sliding scale downward according to the coldness of the weather, regardless of whether the windows are single or double.

Practically all homes have single thickness glass windows. Very few of their owners will go to the expense of installing double windows. Furthermore, it is not necessary to have double windows. Chart No. 5 shows that in weather from about 22 degrees and upward, the room humidity can be maintained from 30 per cent and upward without incurring excessive window moisture on single glass windows. The room humidity needs to be reduced below 30 per cent only during the few short periods of colder weather.

The harm to health and belongings which is done by low humidity occurs only upon long exposure to low humidity. The greatest benefits from humidifying come from the first ten per cent of increased humidity. Less gain in benefits result from further increase and very little is gained by increasing the humidity above 30 or 35 per cent while substantially nothing is gained by increasing it above 40 per cent. When room humidity is maintained upon a sliding scale—lower humidity in cold weather and higher humidity in more moderate weather—the home owner secures practically 100 per cent of the benefits.

Double windows are therefore not necessary for the maintenance of adequate humidity. Their principal advantage is in eliminating window vapor. Adequate humidity can be maintained with single windows by some sacrifice of window clarity; but with the room humidity controllable or automatically controlled upon a sliding scale to conform to window glass temperature changes, no excessive window wetness need be incurred. This is a fact important to the conditioned air heating industry because it means that the huge market represented by homes having the usual single windows is wide open and the right kind of humidifying equipment can do an adequate job of humidifying.

Referring now to the window Condensation Chart, the distance "v" from Curve N to Curve V indicates how much moisture must be added to raise the indoor humidity up to the window vapor point. In colder weather slightly less evaporation is needed to reach the window vapor point and if we supply evaporating equipment which can vaporize enough water per hour to raise the humidity from the natural humidity shown by Curve N up to 40 per cent during 35 degree weather then the increasing heat of the furnace during colder weather will easily be able to increase evaporation and maintain 40 per cent humidity in any colder weather should this be desired.

During 35 degree weather, the indoor air at 70 degrees will contain about 23 grains of moisture per pound if no moisture is added. If the humidity is raised to 40 per cent the air will contain 44 grains per pound. The difference is 21 grains of moisture per pound of air which is the amount of water which must be evaporated for every pound of outdoor air (13.5 cubic foot) that enters the house. This is equivalent to 1 quart per hour (6 gallons per day) for each 10,000 cubic feet of entering outdoor air per hour.

In other words, to find how many gallons of water must be evaporated *per day*, divide the volume of outdoor air which enters the home *per* hour by 10,000 and multiply by 6.

Required Size of Evaporating Equipment

Having determined the rate of evaporation per day which is necessary to maintain the desired room humidity our next problem is to find what size of evaporating equipment is needed to supply the required evaporation.

The evaporating equipment may be a spray, an air washer or an evaporating pan. As an evaporating pan located in the bonnet of the furnace is the most popular method this is the only one that will be considered here.

The evaporation from such a pan is proportional to the area of water surface exposed but the rate of evaporation per square foot of water surface depends mainly upon the temperature of the water and the temperature of the air which circulates around the pan. Air velocity or turbulence has a minor influence and the influence of the relative humidity of the air coming into the furnace is still smaller. The last two may therefore be disregarded.

The water temperature is dependent upon the heat it receives by conduction, radiation and convection and this has considerable influence in increasing the rate of evaporation. We can, however, assume that the water temperature is proportional to the temperature of the circulating air in the furnace bonnet and on that basis the evaporation per square foot of exposed water surface which

EVAPORATION FROM WATER PANS IN BONNET

Designed Register Temp. in 0° weather	Gallons per day per square foot water surface during 35° weather	
	Gravity Circulation	Forced Circulation
200°	6.5 Gals.	.....
190°	5.7 Gals.	.....
180°	5. Gals.	.....
*175°	4.5 Gals.	.....
170°	4.1 Gals.	2.7 Gals.
160°	3.4 Gals.	2.3 Gals.
150°	2.6 Gals.	1.8 Gals.
140°	1.9 Gals.	1.3 Gals.
130°	.....	1.1 Gals.

CONDITIONS ASSUMED:—Evaporating pan in furnace bonnet. Rooms warmed to 70 degrees. Evaporation for gravity circulation is with or without thermo-control. Evaporation for forced circulation is with thermo control and intermittent blower operation.

* 175° register temperature is "Code" design gravity circulation.

can be expected will be as shown in the table.

The rates of evaporation given in the table above are based upon a combination of tests, calculations and practical experience and assume a well-designed and located pan in the dome or bonnet of the furnace, not exposed to direct heat conduction from the furnace castings.

Note that the given evaporative rates are for the average bonnet temperatures prevailing during 35 degree weather. In the case of pans in furnaces having forced intermittent air circulation, the average bonnet temperature may vary to some extent in different installation according to the automatic blower control settings—temperature at which blower comes on and off, speed changes, etc. The evaporative rates given in the "Forced Circulation" column are however safe averages reflecting the best known data of today.

The evaporative rates are given for average bonnet temperatures prevailing during 35 degree weather. As weather gets colder, the furnace bonnet temperature and, therefore, the rate of evaporation, will increase. We must however, have ample evaporative capacity during milder winter weather, and if we have sufficient evaporation for 35 degree weather, we shall be sure of having ample evaporative capacity for all colder weather.

Study of the evaporation table will clearly show a number of very important facts. Note that in gravity heating plants designed for 175 degrees register discharge temperature in zero weather, the evaporation during 35 degree weather will be at the rate of about 4½ gallons per day for each square foot of water surface. If, in the same house and same size furnace, the leader areas are cut down so as to have a register temperature of 200 degrees, the rate of evaporation will be about 6½ gallons per square foot of water surface per day. On the other hand, if the leader areas, for the same size of house and furnace, will be increased so that in zero weather the register discharge temperature will be 140 degrees, the evaporative rate will be only 1.9 gallons per square foot per day. This means that in one case the area of water surface provided must be 3.4 times as great as in the other case.

The volume of outdoor air per hour coming into one house may be 4 times as great as in another house requiring the same size furnace. If the first mentioned house should have its heating plant designed for 140 degrees register temperature and the house of small leakage should have its heating plant designed for 200 degree register temperature, then the required water surface area in one case would have to be almost 14 times as great as in the other—both having the same size furnace. This very definitely proves that the size of evaporating pan required is not governed by the size of the furnace, or of the house.

Comparison of the evaporative rates for pans in furnaces having gravity circulation with the evaporative rates of pans in furnaces having forced circulation conveys additional important facts. Note that in a gravity job having its leaders proportioned for 170 degree register temperature in zero weather the evaporative rate will be 4.1 gallons per square foot, but if the ducts are designed for forced air circulation and the same register temperature in zero weather, the evaporative rate during 35 degree weather will be only 2.7 gallons.

Of course, when a gravity job is converted to a forced air circulating job, the air velocity increase will cause a reduction in bonnet temperature. A typical case is a Code designed heating installation (175 degree register temperature) evaporating 4½ gallons per square foot, converted to forced air circulation and then having 160 degree register temperature in zero weather. This reduces the evaporative rate to 2.3 gallons per square foot. The water pan will then have to have twice its former water surface area, assuming that its former area was sufficient for 35 degree weather.

Having found how many gallons of water are required to be evaporated per day, select the rate of evaporation per square foot that can be expected from an evaporating pan in the furnace under consideration and divide the required total evaporation by the expected evaporation per square foot of water surface and the result will be the required area of the evaporating pan in square feet.

You will probably find that the required size of evaporating pan is larger than you expected. If the required water surface area seems impractically large, reduce the evaporation required by eliminating needless outdoor air intake area and weather stripping the windows.

The result of a water pan that is too small will be that the room humidity obtainable in 35 degree weather will be proportionately less than 40 per cent—about 1 per cent point less for each 5 per cent shortage of water surface. Thus, a water pan that is 25 per cent short of the required water surface will be able to maintain a maximum indoor humidity of about 35 per cent during 35 degree weather, instead of 40 per cent but will be able to maintain 35 per cent humidity or higher in colder than 35 degree weather.

Controlling Room Humidity

The water surface area of a humidifying pan must be large enough to evaporate sufficient water to raise the room humidity to 40 per cent during bonnet temperature existing in 35 degree weather. As weather gets colder the bonnet temperature will become higher and the rate of evaporation will increase rapidly. To prevent the excessive room humidity that will occur to an increasing extent as the weather and windows become colder, the rate of evaporation must be limited by the rate at which water is fed to the humidifying pan.

One method of controlling the room humidity is by means of a humidistat located in one of the rooms. This is manually set to maintain the desired room humidity, being reset

(*Continued on page 58*)

Meters and Metering*

Simplification and Standardization of Meter Repair Cost Accounting

By D. P. Allen

Chairman, Washington Gas Light Co., Washington, D. C.

AS was pointed out in the 1935 report of the Subcommittee on Meters and Metering, it is very desirable to accomplish uniformity of meter repair cost accounting:— (1) by classifying and defining the general accounts applicable to maintenance of consumers' meters, with the corresponding segregation necessary for analytic comparison; (2) by defining the various classes of repair with detailed itemization of all operations to be included in each class; and (3) by deriving a simplified method of determining the repair cost by size and by class of repair. Some meter repair shops have more detail and different breakdowns of the accounts and have different shop practices, but if the same general classification of accounts is accepted, if the same operations are included in each class of repair, and if a logical system of repair cost accounting by size and class of repair is employed, then costs are comparable among the companies regardless of the wage scales and shop systems of each.

(1) Classification of Accounts

Meter repair shop costs should begin with the delivery of the meter to the shop where the actual testing and repairing is performed, and include all of the expenses until the meter is placed in O.K. stock or condemned. A description of the chief accounts which are usually components of the total cost of maintenance of consumers' meters is briefly outlined (with comments) as follows:

(A) Distribution Superintendence Meter Shop

This account shall include that portion of the time of the Engineer of Distribution; the Superintendent of Distribution, members of the engineering staff and others, devoted to meter shop interests; making special studies, compiling data for comparisons with other companies and any other work which would not ordinarily be performed by the meter shop employees.

At the present time there does not seem to be any generally accepted clear cut distinction between this account and the Maintenance of Consumers' Meters—Overhead account. The distinction presented here is suggested for ease of analysis in comparing overhead costs. However, it must be borne in mind that for purposes of comparing costs, both accounts plus Distribution Supplies and Expenses should be included in the calculation of overhead per meter. In other words, the sum of the three accounts is the total meter shop overhead applicable to the cost of maintenance of consumers' meters.

(B) Distribution Supplies and Expenses—Meter Shop

This account shall include the cost of office maintenance and incidental expenses of the shop such as light, heat, power, telephone, water, ice, etc., stationery and other office supplies and minor office furniture and accessories not chargeable to Fixed Capital. Supplies necessary to the clerical work of keeping and compiling meter repair shop records should be charged to this account regardless of which department the work originates in.

It may be considered that some of the items included in the above definition are chargeable to either overhead or direct expense under Maintenance of Consumers' Meters, but it is advantageous to remove these items from overhead or direct expense to facilitate analysis of the components of the Maintenance of Consumers' Meters account, as described below.

(C) Maintenance of Consumers' Meters—Overhead

This account shall include the time of the Superintendent of Meter Shop, any supervisory time of meter shop foremen, that portion of the time of any clerks devoted to compiling meter shop records regardless of the department with which they may be affiliated, and that portion of the time of any others which contributes to the upkeep and operation of the snop, such as timekeepers, messengers, watchmen, janitors, etc.

It will be noted that the above account is composed entirely of payroll costs and this fact should facilitate overhead analyses.

Maintenance of Consumers' Meters—Direct Expenses

(D) Labor

This sub-account shall include all labor of foremen, and time of repairmen and others relative to testing, adjusting, repairing, replacing badges, painting, packing, cartage, unloading and other incidental operations necessary to shop maintenance of consumers' meters.

(E) Material

This sub-account shall include all material used in the actual repair of a meter; such as, parts, solder, acid, soldering coppers, diaphragms, paint, yarn, badges, diaphragm oil, stuffing box lubricant, etc.

(F) General Expenses

This sub-account shall include other direct expenses such as tools, charges made by the inspection bureau or other regulatory bodies for testing and sealing used meters and any direct expenses other than D and E.

The direct expenses are segregated into the three subs above for advantages of analysis. The labor and material costs will afford indications of shop efficiency and of the expediency of certain practices, and the general expenses will include miscel-

(Continued on page 58)

*Abstract from Progress Report of the Subcommittee on Meters and Metering, presented at the A. G. A. Distribution Conference, Memphis, Tenn., April 8, 1936.

Speak Up . . .

In Your Spring Heating Displays

By Stuart Bratesman
Mgr. Display Department,
Boston Consolidated Gas Co.

TOO long has the gas industry been relying on heating copy that attempts to sell people with a conservative, "we are above reproach" attitude. In the meantime, our competitors have gone out and been "laying it on thick." It's about time we spoke out, not in defense of our product and service, but in an aggressive, progressive manner that will convince people that gas is not an old-fashioned fuel, but the fuel of today and tomorrow.

The heating season is about over. For some unfortunate individuals, it will never be over. A person who has had nothing but trouble and headaches from his heating system all winter is in a swell frame of mind for a logical story on the advantages of automatic gas heat. Get that story to this type of person through your window displays.

Another thought; in the spring the house comes in for its annual cleaning. If the heating system is one that gives off smudge and dirt, the job will have to be done again and again. But, with clean gas heat, the cleaning job becomes a mere routine, not half so constant or arduous. Tell this to the housewives in your territory . . . it will get lots of leads.

Study the heating displays reproduced with these thoughts. The company that used them is doing a bang-up job of selling gas heating to the territory it serves. A few years ago, it adopted a policy of straight-forward advertising and salesmanship. It struck back at all absurd competitor claims and erroneous criticisms and followed this up with a clear, concise story of the many advantages of effortless gas heat. A steady program of carefully planned window display advertising played a big part in this activity.

There was no back-pedalling, no taking a back seat and letting competitors steal the whole show. With a great service like gas heating to sell, the job should be comparatively simple. Look at what a wonderful job the oil people are doing, with an inferior product. What's the answer? Wide-awake advertising and merchandising methods . . . nothing else.

Give a thought to this heating question, today . . . and remember, one of the first sales helps to consider is window displays. For productive, far-reaching results, they're hard to beat. Give them a try.

don't
be misled by wild heating claims!
HEATING UTOPIA
GAS HEAT
offers you proven advantages not high-pressure words investigate this really modern type of heating today

RUUD

Check with RUUD for gas water heaters for spring and summer selling. RUUD is the all-markets line, —for mass and class,—blanketing every prospect from one faucet to a thousand. Made for all gas and water conditions. Hand-fired and automatic . . . . full-speed and low-speed, storage and faucet-action. AND LOW IN PRICE!

Enter the National Water Heater Sales Contest

There's a RUUD Water Heater for every gas meter!

WRITE FOR COMPLETE DETAILS

Ruud Manufacturing Company
Pittsburgh, Pa.

LOW PRICED NEW MODELS

"Giving Genuine Satisfaction" SAYS MYRON GREEN FAMOUS KANSAS CITY RESTAURATEUR

● The art of fine cooking as practiced by his restaurants in Kansas City has earned for Myron Green a national reputation and substantial credit for contributing to the advancement of the restaurant industry. Regarding his Magic Chef installation he writes:

"It is a real pleasure to advise you of the genuine satisfaction your new Heavy Duty Magic Chef ranges are giving us.

"Our purpose in purchasing new ranges was to provide our women cooks with ranges that would produce the finest quality of baking, reduce the heat in the room and save gas.

"Let me quote abbreviated comments from the cooks using these ranges:

'The new ranges are perfect in every detail.'

'Eases the strain of cooking.'

'On account of heat control, there is no danger of burning up food.'

'No intense heat around the front of the ranges.'

'The oven doors are not only noiseless but so light and easy to handle.'

'I have never had the pleasure of using ranges that cook so evenly and thoroughly.'

'Easily cleaned and retain their good appearance.'

"I might add my personal comment that I feel that you have contributed much to better baking through the introduction of these new ranges. They have taken the guesswork out of cooking."

Magic Chef Heavy Duty Equipment offers you every advantage demanded by modern food service requirements. Write for details.

AMERICAN STOVE COMPANY
BOSTON • NEW YORK • ATLANTA • CLEVELAND • CHICAGO
ST. LOUIS • PHILADELPHIA • SAN FRANCISCO • LOS ANGELES

Magic Chef
AMERICAN STOVE COMPANY

LOOK FOR THE RED WHEEL WHEN YOU BUY A MAGIC CHEF

MAGIC CHEF HEAVY DUTY *Automatic Equipment*

FOR MODERN GAS COOKING

Three Million In Delayed Gas Range Sales

By J. J. McKearin,

Sales Manager, Lowell Gas Company, Lowell, Mass.

FROM Maine to California there are three million families waiting to buy new, modern gas ranges. The effort necessary to sell them is not nearly as great as one might expect. Here, in Lowell, Mass., a typical New England mill city with 20,000 domestic gas customers, we have been able, during 1935, to prove to our satisfaction that the Smiths and the Joneses are in the market for new ranges.

During the lean years from 1930 to 1934 there was a lack of both buying power and of confidence. It is impossible to say which created the greatest sales resistance, the actual lack of money with which to buy or the uncertainty in regard to the future. Of one thing, however, we can be certain. There is not the lack of confidence in the future there has been in the past. In 1935, the automobile industry had its best year since 1929. People have been buying automobiles. They have also been buying furniture. If they have money they are more willing to spend it for what they want than they have been for the past four years.

From the date of the stock market collapse in 1929 right on to the end of 1934, Mrs. Smith, Mrs. Jones, and all the other average domestic customers came into our office each month, paid their gas bills, looked with envious eyes at the new modern gas ranges on display but did not buy. They returned home with saddened hearts and a feeling of dissatisfaction with things as they were. They continued to prepare the dinner for husband and children on old, obsolete, perhaps worn out gas ranges. For four years and more this potential desire for a new gas range grew and it could be but a matter of time before it changed to an active desire which must be satisfied.

Backbone of Industry

We believe the gas cooking customer is the backbone of the gas industry. A thoroughly satisfied user of a modern gas range is the logical buyer of a gas refrigerator, automatic water heater, house heater and any other appliance the gas company has for sale. We keep this point in mind when working out appliance sales campaigns. It is the gas range that has popularized the use of gas in the past and it is the new modern gas range which is the first step toward selling other modern gas appliances.

We believed that 1935 was the year to go after those delayed gas range sales with the enthusiasm and the energy necessary to close just as many of them as possible. Accordingly we contracted with a prominent manufacturer of gas ranges to supply us with an all-insulated, semi-enameled, heat controlled, console type range. All of these were to be of the same model, size and color. We set the retail price at $54.66.

Bear in mind that we have 20,000 domestic customers. The contract we made called for a number of ranges equal to 2½ per cent of the total number of customers who would be able to use them. From 1927 on to 1935 there were only four years in which we exceeded a total of 500 ranges sold in a year. Two of these years, 1929 and 1931 we made high pressure gas main extensions which resulted in adding new consumers who just naturally bought ranges.

Results

We armed our salesmen with large hand bills, telling about the new, modern gas range we were offering, the advantages of having such a range, giving the price and terms and other arguments for buying. These salesmen made a straight canvass of customers using old ranges or not using gas for cooking. It is putting it lightly to say that the results were gratifying. Orders literally came pouring in. By May 30th we had sold and installed 700 of these ranges. This was a greater number than we had sold and installed during any one year since 1927 with the exception of the two years when we extended our high pressure gas mains. It represented approximately one range sold for every 28 domestic meters. Of these sales, 237 or 35 per cent were made to customers who had not been using gas for cooking.

Fall Campaign

In the early fall we conducted another range sale aimed at making sales to those who already had sufficiently modern and new ranges to make them difficult to sell during the first campaign. For this purpose we selected the newest creation in the way of a gas range. This was all porcelain, table top, full insulated and heat controlled, complete automatic lighting and with a minute-minder clock. It was what we considered the very latest and best range for the purpose on the market. We set the sale price at $69.50 cash delivered with the old gas range taken in trade.

It was to be expected that, since we had already sold in 1935 during the first nine months, twice as many ranges as we sold during the entire year of 1934, that we would have a very hard time making our full campaign a success. Yet the Smiths and the Joneses came through. Over 200 of these new ranges were sold during the last months of 1935.

When the gas range sales results for the year were totaled we found we had added 400 new gas cooking customers to our lines with no increase in the population of the city. That is, we had added one new gas cooking customer for each 50 domestic meters in service at the beginning of the year. The total range sales for the year amounted to 1233 sold and installed. In approximate figures this means that we sold one gas range for every 16 domestic meters. This record convinces us that gas users are now ready to buy those ranges which, for the past years, they have put off buying and in our opinion there are in this country at the present time, no less than three million gas range sales just waiting to be closed. It has been interesting to compare our 1935 sales with those of previous years. The following table shows the comparison.

Year	Gas Range Sales
1928	448
1929	*922
1930	563
1931	*892
1932	389
1933	405
1934	532
1935	1233

*High pressure gas main extensions were made during these years.

An analysis of these figures shows that during 1930, 1932, 1933 and 1934, the years during which there were no high pressure gas main extensions, we sold a total of 1889 ranges or an average of 472 ranges a year. The total when the 1935 sales are added becomes 3122 or an average of 622 ranges a year. Had the Smiths and the Joneses not been delaying the purchase of a new gas range, there is reason to believe that we would have sold approximately 600 ranges during each of the years 1930, 1932, 1933 and 1934. During the poorest year, 1932, we sold but 389 ranges. The year 1934, however, approximated that of 1930. A study of these figures, therefore, leads to the conclusion that we closed some 600 delayed range sales.

The experience of the automobile industry also bears evidence that there are delayed sales which are being closed. In round figures the automobile production was five million in 1929, three million in 1930, two million in 1931 and one million in 1932. Sales then began to pick up but it was 1935 which proved to be the good year with a production in excess of four million.

Just as there have been improvements in the automobile which serve to reduce sales resistance, so there have been improvements in gas ranges which serve the same purpose. For years gas users have been repressing the desire to buy a new range. In some cases it has not been possible for them to buy. They have not had the money. In other cases it has been due to uncertainty in regard to future income and fear that if a contract is made to make deferred payments there will not be sufficient income to make them. There is far less of this fear than there has been in the past. There is more and more a determination to satisfy desires which have long been unsatisfied. Hence the tremendous increase in the purchase of automobiles and also the tremendous increase in the number of gas ranges we were able to sell during 1935. The time has certainly come when we can close those delayed sales. The year 1936 should surely be a record year in gas range sales which in turn means a record year in the gas sold to the average domestic customer.

Sales and New Equipment Emphasized at First Industrial Gas Sales Conference

The first Industrial Gas Sales Conference to be held under the sponsorship of the Industrial Gas Section was held in Detroit, Michigan, March 10 and 11. The registration showed that men came from sixteen states, Ontario and District of Columbia. The total attendance was over one hundred and twenty-five. Fifteen manufacturers were present as were seventeen engineers and industrial plant managers from outside the gas industry. Approximately half the balance of those attending represented natural gas companies and half represented manufactured gas companies. Charles W. Gale, Chairman of the Industrial Gas Section, and Ralph L. Manier, Vice Chairman, presided at the various sessions.

The entire theme of the conference was sales and the new industrial gas equipment and new heating processes that are now available to help make sales. This theme was emphasized by the keynote speaker, Mr. Frank T. Rainey, new business manager of Ohio Fuel Gas Company, and by most of the other speakers. Mr. Rainey brought out some interesting sidelights on the human qualities needed for selling industrial gas.

A very complete discussion of the various business angles that should govern trial installations was made by Mr. F. B. Jones of Equitable Gas Company, Pittsburgh, Pa., in his paper entitled "Effective Methods of Handling Test and Trial Installations." He advocated the use of a revolving fund by each gas company industrial gas department and expressed the opinion that such a fund could be maintained substantially intact over a period of years. He showed a number of instances where the judicious use of trial installations had secured new business and had been instrumental in holding old business. He also cited several cases where such installations had not been effective and analyzed the causes.

The immense ceramic field, one of the largest heat consuming markets in the country, was discussed by T. E. Wood, Industrial Manager of The Manufacturers Light & Heat Company. Mr. Wood showed how ceramic firing is gradually being refined, being speeded up, and how in many instances unit costs are being reduced. As the refinement processes continue gas becomes an increasingly important factor.

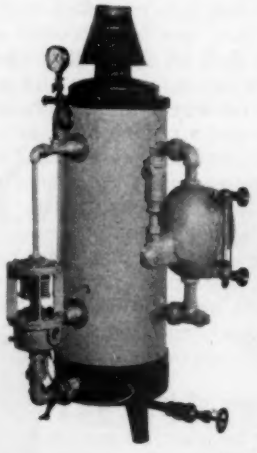
In the specialized field of manufacturing brass and copper the utmost in refined heating operations is required, it was pointed out by W. W. Young, Jr. of the Connecticut Light & Power Co. In presenting his paper "New Developments in the Brass and Copper Industry and the Part Gas is to Play in this Industry," he took his audience through a modern brass plant and figuratively stopped at each place where process heat is needed. Samples of modern products in the making were displayed, and sales arguments for gas were analyzed in the light of present competitive conditions.

The conference was particularly fortunate in having as the speaker for the "Executive Luncheon" Mr. Claude A. Welch, Assistant Superintendent, Chevrolet Motor Company. Mr. Welch, an experienced automobile production executive, told how the use of modern gas furnaces contributes toward cheaper, speedier production and enabled certain plant layouts under crowded conditions that were not possible when the older heating methods were used.

Spirited discussions followed the presentation of papers. There was a tendency to favor the practice of industrial gas departments primarily concentrating on plant contacts and sales work, leaving the greater part of the necessary engineering to equipment manufacturers. A number of angles of the competitive situation was handled by men who discussed the papers from the floor.

Wednesday was devoted entirely to an inspection trip of Detroit industries.

Pressing Machine and Steam Iron— BOILERS



P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

News of the Gas Industry

New Jersey Gas Association Celebrates Silver Anniversary

The Twenty-fifth Annual Convention of the New Jersey Gas Association was held at The Berkeley-Carteret Hotel, Asbury Park, N. J., on April 2nd.

The New Jersey meetings always bring out a large and enthusiastic attendance. This year was no exception and about 900 persons were present.

Mr. T. R. Crumley, President of Jersey Central Power and Light Company, welcomed the members of the Association to Asbury Park.

Following that, Mr. Herbert E. Cliff, President of the Association, presented his report and other matters of business were disposed of.

Major Alexander Forward, Managing Director of the American Gas Association then introduced Mr. Herman Russell, President of Rochester Gas and Electric Company and Vice-President of the Association. It is hardly necessary to mention that Mr. Russell is Chairman of the Committee on National Advertising. He chose national advertising as the subject for his address and he gave those present a most interesting and comprehensive picture of the problems ahead. Pledges for the necessary financial support have been received but this means that the work has just begun.

The feature of the Convention was a symposium on "Heating Water with Gas." This included papers on market survey, discussion of the M.I.T. water heater tests, determination of type and size of water heaters and plumber-dealer cooperation.

Papers on the new coke ovens at Camden, N. J., on commercial gas sales and on rates, together with the water heating symposium made up a most interesting program.

No report of the Convention would be complete without mention of the "Mystery Chef" who was present in person and gave one of his brief but delightful little talks which show so clearly why he is one of radio's most popular personalities.

The following were elected officers for the ensuing year:

President, W. S. Potter, Elizabeth, N. J.; First Vice President, H. P. J. Steinmetz, Newark, N. J.; Second Vice President, R. W. Wiederwax, Atlantic City, N. J.; Secretary-Treasurer, G. B. Webber, Newark, N. J.

The following papers were presented:

Camden Coke's New Ovens, P. H. Winch, Camden Coke Company; Our Commercial Gas Sales, Harry A. Sutton, Public Service Electric and Gas Company.

Heating Water with Gas

We Have the Market, Lester M. Ginsberg, Cambridge, Mass.; Comparative Costs of Water Heating, Professor Gordon B. Wilkes, Massachusetts Institute of Technology; We Have the Equipment, R. J. Caniff, Pittsburgh Water Heater Company; We Have Plumber-Dealer Cooperation, H. S. Christman, Philadelphia Gas Works Company; Let's Sell 'em, William F. Hope, Newport Gas Light Company.

E. B. Strauss, Chairman of the Awards Committee, presented $100 in prizes to the following for the six best papers submitted by gas company employees on the subject, "How to Improve Our Business":

1st Prize—G. A. Parker, Jersey Central Power and Light Company, Asbury Park, N. J.

2nd Prize—Wm. Darnall, Jr., Atlantic City Gas Co., Atlantic City, N. J.

3rd Prize—Edward S. Simpson, Public Service Electric & Gas Co., Newark, N. J.

4th Prize—John L. Wood, Jersey Central Power and Light Co., Asbury Park, N. J.

5th Prize—Edward R. Eberle, Public Service Electric and Gas Co., Newark, N. J.

6th Prize—J. Hadden, Newsome, Elizabethtown Consolidated Gas Company, Rahway, N. J.

A.G.A. Natural Gas Department to Hold Meeting in Dallas, Texas

Arrangements are rapidly being completed for the meeting of the Natural Gas Department of the American Gas Association to be held in Dallas, Texas, May 5-8. The two largest hotels in downtown Dallas, the Baker and the Adolphus, have been selected as joint headquarters, and reservations already received by Capt. A. E. Higgins, secretary of the department, at Dallas, indicate one of the largest attendances in several years.

Slighting the time-honored questions of taxation, legislation and government regulation, the May meeting is centering directly upon the industry's marketing problems, and improvements in technical processes, both production and transmission, which maintain the service to make the marketing possible. Conservation, too, will receive a large share of attention according to the tentative program.

Choice of Dallas for the May convention brings natural gas deep within its own territory, for Dallas is widely known as the southwestern capital of natural gas.

The following chairmen will be in charge of local committees handling arrangements for the convention: R. G. Soper, general chairman; L. B. Denning, Jr., transportation chairman; C. K. Patton, reception and attendance chairman; George W. Martin, program committee chairman in charge of local arrangements; W. C. Grant, publicity; B. R. Newbery, entertainment chairman.

Striking straight to the heart of the natural gas industry's problems, three phases of load building will be featured at the general session on Thursday afternoon. Of strong interest to every delegate will be the discussion of "The National Advertising Program" to be presented by Herman Russell, president of the Rochester Gas & Electric Corporation of Rochester, N. Y.

"Dealer Co-Ordination," a subject of vital importance to the natural gas industry, will be discussed in an address by H. F. Smiddy of Ebasco Services, Inc., of New York City. With legislation prohibiting sales of appliances by utilities already enforced by one state and cropping up with new legislatures in others, the question of building an active, strong, and intelligently directed dealer organization is of unusual timeliness.

"Sales Possibilities in Air Conditioning" will also mark this general session as one of definite value to every member of the department.

Another outstanding feature on the program will be the session devoted to natural gas utilization and sales promotion, of which J. V. Strange, of the United Gas Public Service Co., Houston, will be chairman, and at which addresses of thought-provoking substance will be presented. H. W. Geyer, Southern Counties Gas Co. of Los Angeles, will discuss "How Much Free Appliance Service Can Natural Gas Companies Afford to Give?" This question is one with which every gas company is faced, and the experiences of Mr. Geyer's company will contribute much to individual solutions of the problem. For a number of years, gas companies have been searching for an answer to the question of how to reach the large section of their market represented by gas users who do not own their own homes. How one alertly merchandising company is meeting this situation will be told in an address on "Reaching Non-Home Owners for Water Heating," delivered by F. M. Rosenkrans, new business manager for the Gas Service Co. of Kansas City, Mo.

"Selling Improved House Heating for Better Customer Satisfaction and Large Company Revenue," delivered by C. K. Patton, new business manager for the Dallas Gas Co., will relate the experiences of a company confronted by a market, which, although almost saturated from the standpoint of gas heating, nevertheless was not producing satisfactory revenues because of inadequate or obsolete equipment and partial heating of homes.

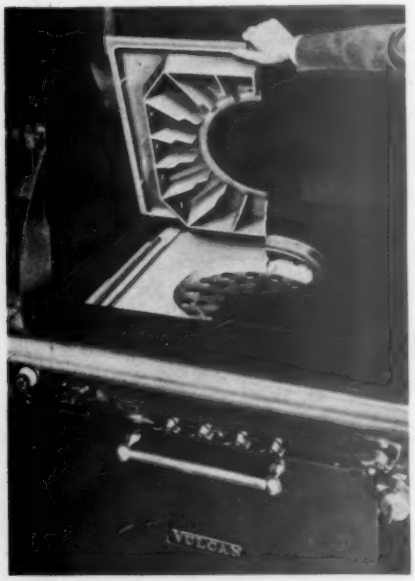
Among the outstanding addresses of general interest on technical matters will be a paper on "Geophysics in Oklahoma," by J. R. Hatfield of the Indian Territory Illuminating Oil Co. of Bartlesville, Okla.; "Dust Proofing Compressor Stations," by L. W. Jackson of a Texas natural gas company; and "Reforming Natural Gas for Producer Gas Equipment," by George M. Parker, industrial fuel engineer for the Mississippi River Fuel Corporation of Saint Louis, Mo.

New Radial Fin Cooking Top for Heavy Duty Gas Ranges

A new radial fin cooking top for heavy duty gas ranges has recently been announced by the Standard Gas Equipment Corporation, New York, N. Y.

This new top (patent applied for) is said to be the greatest advance in cooking tops since the original Vulcan All-Hot-Top. Tests have shown remarkable savings as high as 20%, in the amount of gas used to bring the top to working temperature and keep it hot.

The great efficiency of the top is largely made possible by a series of radial fins, forming radial flues, and cast as a part of the under side of the top, extending down to the fire brick inside the burner box.



These fins increase the absorption surface 68%. They retard the movement and distribute the hot flue gases, picking up the heat units usually wasted and transferring them to the top where they can do useful cooking work.

In addition, the radial fins and flues distribute the flue gases to all sections of the top, resulting in higher temperature at the sides than was formerly possible, while still maintaining the high temperature in the center ring. As there is a larger area of hot working surface, one of the new tops will frequently do the work of two ordinary tops.

The chrome nickel alloy top is twice as heavy as ordinary tops and provides a greater storage of heat so that a cold pot is heated more rapidly. Thicker fire bricks around the burner and under the top store live active heat, ready for use. Incidentally, the radial fins serve to reinforce the top.

All these factors combine for less gas consumption and faster cooking than has previously been possible.

The radial fin top is furnished on the new Vulcan No. 4730-YT, and also on the No. 4740-YT top temperature control ranges, both having automatic oven heat control and insulated ovens.

The manufacturers, Standard Gas Equipment Corporation, 18 East 41st Street, New York, will be glad to supply further information on the new Radial Fin Top.

Minneapolis-Honeywell Air Conditioning, and Heating Booklet

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., has issued a booklet titled "This Thing Called Automatic Heating and Air Conditioning." There are so many elements that play a part in both automatic heating and air conditioning that an understanding of all of them is important. The booklet gives a comprehensive consumer story of the subjects. It is a salesman's manual giving detailed information on the functioning of the various appliances used to produce the desired results such as thermostats, protective controls, low water cut-off, summer and winter control systems, etc. It contains a fund of valuable information, and a copy will be mailed on request to the company.

National Water Heater Contest Stimulating Interest

The National Automatic Gas Water Heater Sales Contest sponsored by the Gas Water Heater Division of the Association of Gas Appliance & Equipment Manufacturers announce that already 346 gas companies and 1566 plumbers throughout the country have registered in the Contest.

There is still time for gas companies to participate in the eight months contest; in any two months contest up to September 30 to receive monthly prizes for salesmen on their sales records for March through September.

"Panhandle Eastern" Orders Big Compressor Units for New Line to Detroit

The Cooper-Bessemer Corporation has been awarded a contract by the Panhandle Eastern Pipeline Company, of Kansas City, Mo., for 14 twin-tandem gas-engine-driven compressor units. Largest order since 1930 for equipment of this kind, it calls for twelve 1300-H.P. units, and two 1000-H.P. units. The engines will pump natural gas from the Texas Panhandle to the city of Detroit.

The Panhandle is one of the longest natural-gas pipe lines in the world. It was built in 1930 and equipped with Cooper-Bessemer engines and compressors. The present system extends a distance of 1350 miles between western Texas and a point north of Indianapolis. This great natural-gas carrier will supply the new line being laid by the Columbia Gas & Electric Company from eastern Indiana to Detroit.

Correction

In a news item in March issue on Union Gas Co. of Canada pipe line, it was stated 1700 Dresser couplings were used in its construction, It should have read "over 17,000 Dresser couplings were used."

W. M. Chace Company Now Occupying New Addition to Their Plant

The third plant expansion in ten years for W. M. Chace Company, manufacturers of Chace Thermostatic Bimetal, has been completed. The added new laboratory and manufacturing facilities are now in use.

While it was necessary to double the size of the Chace plant in 1934, due to the rapid increase in the use of Chace Thermostatic Bimetal in temperature control devices, last year it again became necessary to begin a large plant expansion.

The recently completed addition increases floor space nearly fifty per cent. The additional quarters have been equipped with new manufacturing equipment. Laboratory facilities have been greatly enlarged and considerable new and modern laboratory equipment has been installed. This provides the most complete and modern plant and laboratory of its kind in operation today.

C. A. Herman Joins Detroit-Michigan Stove Company

Clarence A. Herman, the fifth American Gas Association Laboratories engineer to step into commercial phases of the gas industry during the past three months, commenced service with the Detroit-Michigan Stove Company, Detroit, on February 15, 1936. Mr. Herman, as development engineer, will work arm-in-arm with Nelson L. Miller, also a Testing Laboratories veteran, who has been with the Detroit appliance manufacturer for a year and a half.

Having been associated with the Laboratories for exactly six years, Mr. Herman has worked as both testing and research engineer. He has spent approximately one-third of his period of service at the Pacific Coast Branch Laboratory in Los Angeles. Recently the interesting and progressive projects sponsored by the Committee on Domestic Gas Appliance Research have occupied Mr. Herman's time.

Mercoid Corp. Opens Boston Office

The Mercoid Corporation announces the opening of a branch office and warehouse in Boston, Mass., at 25 Ivy Street, corner Park Avenue near Beacon Street. A complete line of Mercoid controls will be carried in stock, thereby assuring prompt service for the convenience of the trade in the New England territory. Mr. A. W. Barr will be in charge.

Book Review

"The Four 4's of Complete Gas Cooking Service," by William E. Leverette, Nashville Gas & Heating Company, Nashville, Tenn. Price on Application to the Author.

This is an attractive little booklet of 22 pages intended for distribution to gas range prospects, dealers, architects, employees or any who should be told of the specific merits of gas cooking. In the words of the author, "this booklet is printed as briefly as possible and with many animations. We could have written and assembled one three or four times as big . . . but we found those distributed by us . . . were read because of their brevity."

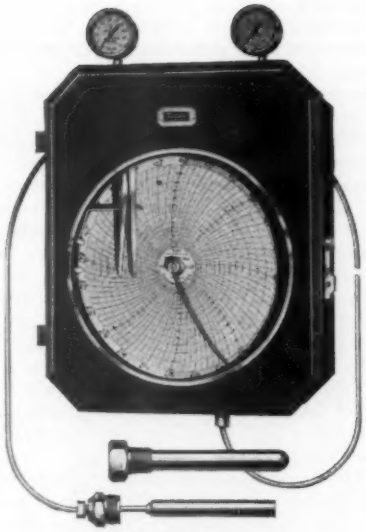
The author explains the title of the book, and incidentally its contents, as follows: "There are four distinct reasons why more people prefer gas than all the other three good fuels combined. These four reasons are as follows, and in the order of their importance: (1) cooking results; (2) utility and application; (3) modernity, and (4) complete cost of cooking service. Each of the four major divisions are again divided into four important factors —hence the Four 4's."

The book is very liberally illustrated with sketches and with illustrations of modern gas ranges. It is not heavy reading although it contains much worthwhile information and many interesting suggestions.

Taylor "Thermospeed" Separable Well Tube Systems

A separable well is required on many temperature measurement and control applications to protect the temperature-sensitive bulb from corrosion or erosion, to give it adequate support, or to permit the removal of the bulb at any time without interrupting the processing.

The extra thickness of metal and the inevitable dead air space between the well and bulb have always caused a substantial delay or lag in transmitting a change in temperature to the bulb. On applications



Taylor "Thermospeed"

having small time lags and heat capacities and where temperatures fluctuate rapidly, this sluggishness of response greatly affects the performance of the instrument.

After months of intensive research on this problem, the Taylor Instrument Companies, Rochester, N. Y., now claim to have perfected a separable well tube system, known as the "Thermospeed," having a speed response closely approaching that of their extremely fast bare bulb tube systems. Laboratory and field tests indicate that the response due to this new construction is approximately six times faster than the average separable well tube system now in service; and almost twice as fast as separable well thermocouples.

So. Gas & Elec. Corp. Sold

Announcement has been made of the sale of the Southern Gas and Electric Corporation, which operates on the west coast of Florida, to C. B. Zeigler, of New Jersey, and associates. A. J. Lawlor, who has been the local manager since the property was acquired from the city of Bradenton, has been named vice president and general manager and will continue in complete charge. Mr. Zeigler stated there would be no change in the corporate name nor in the operating personnel. The company serves Manatee and Sarasota counties.

In anticipation of greater business, plans are being made for necessary replacements and improvements.

National Tube Co. Has Order for Pipe Line to Supply Natural Gas to Detroit

A $3,500,000.00 order for seamless pipe line to supply natural gas to the city of Detroit has been awarded to National Tube Company. This seamless gas line will be 230 miles long, and will run from Zionsville (near Indianapolis), Indiana, to the city of Detroit. Forty-four thousand tons of seamless pipe, 22 inches in diameter, will be required, and this is the largest gas line built in recent years. A large portion of this seamless pipe will be made at Lorain Works of National Tube Company, Lorain, Ohio, and also at National Works, McKeesport, Pennsylvania, and this will give employment to over 5,000 men for over two months. It is expected that construction gangs in the field will start laying this pipe as soon as the frost is out of the ground and it will be rushed rapidly to completion.

General Commercial and Hotel & Restaurant Sales Conference

On Monday and Tuesday, May 25 and 26, the Industrial Gas Section will hold a combined sales conference that will cover general commercial applications of gas and hotel, restaurant and other commercial cooking subjects. This conference will be held in Washington, D. C., at the Mayflower Hotel.

Information on the newer and improved gas cooking apparatus and other commercial gas equipment will be presented by men who have made close studies of present day requirements, and methods of promoting the sale of gas in these fields will be explained by experts.

General Offices Moved

The general offices of the Consolidated Utilities Corporation, operators of the gas plants in Sumter, Anderson and Greenwood, South Carolina, have been transferred from Florence, South Carolina, to Sumter. Maitland S. Chase, Jr., secretary and treasurer of the corporation, will be in charge of the offices.

Mr. Chase has been connected with the corporation for several years. He spent more than a year in Baltimore making an intensive study of the administrative side of the gas business.

10,000,000 Cu. Ft. Waterless Holder for Ford Motor Co.

A $1,000,000 project, involving construction of the world's largest welded steel gas holder of its particular type, has been announced by the Ford Motor Company.

Contract for the gas holder, which will have a capacity of 10,000,000 cubic feet, has been awarded to Stacey Brothers Gas Construction Company, Cincinnati, O. The gas holder will be 220 feet in diameter and 344 feet high—equal in height to a 34-story building.

The construction will involve the use of welded rather than riveted plates, an innovation, and will require 3,000 tons of structural steel plates and shapes, 25 tons of weld rod and 200 tons of miscellaneous equipment. Its reinforced concrete foundation will measure 1,360 cubic yards, supported on 260 piles about 100 feet long, driven to bed rock. About one year will be required for completion of the project.

In construction, this gas holder is unusual as it is of the interior piston dry seal type. The piston will weigh 700 tons. The piston seal will be made up of six layers of special packing, kept gas tight by a series of counter-weights equally spaced around the outer ring of the piston and lubricated by a special grease. A gas tight connection between the piston and the ring holding the packing will be maintained by a continuous special canvas-covered corrugated lead. Elevators will be provided both on the exterior and interior.

Measured-Cooking Week

The advantages of modern cookery through the use of the modern gas range will be brought home to the women of this country in a dramatic manner during the week of May 4 to 9 when gas companies and dealers all over the United States will celebrate Measured-Cooking Week.

Sponsored by the Robertshaw Thermostat Co., manufacturers of oven-heat controls, Measured-Cooking Week is expected to arouse a new and greater appreciation of the advantages of the modern gas range and be the precipitating cause for replacing thousands of antiquated gas ranges in America's homes. Gas companies and dealers all over the country, according to the Robertshaw Co., have expressed their enthusiasm over the prospects of greatly increased sales on modern gas ranges during the week of May 4 to 9.

Home Service Directors of gas companies are already busily engaged in mapping out their plans for competing in the National Home Service Contest that is also being sponsored by Robertshaw for Measured-Cooking Week. The Home Service departments of gas companies all over the country will hold, during that week, special classes in modern cookery, to which the public will be invited to attend. The Robertshaw Co. is offering $1000 in cash prizes for the best cooking and baking demonstrations staged by the Home Service Directors at these free cooking classes.

Elaborate plans have been made by the company for helping utilities and dealers put across Measured-Cooking Week in a big way. The women of the country will be sold the idea through a series of dramatic, attention-getting advertisements in *Collier's*. These advertisements, the first of which appeared in the April issue, will run this month and the early part of May.

Requests for the various types of dealer helps which Robertshaw is offering in connection with Measured-Cooking Week are coming in from gas companies and dealers in all sections of the country, according to the company. These dealer helps include reproductions of the consumer advertising in the form of counter and window display cards, a newspaper mat service—one for gas companies and another for dealers.

The newspaper mat service for gas companies is devoted entirely to publicizing the cooking class which the gas company using the services will stage during Measured-Cooking Week. "Free Lessons in Modern Cookery," "Learn to Cook Automatically at our Special Cooking Classes" and "Modern Cookery Classes are Starting Monday" are some of the headlines in the newspaper mat service series, each advertisement in which is definitely tied in with the Robertshaw national advertising. Space is left in each mat advertisement for the gas company to insert the hours during which the cooking classes will be held each day and, in addition, its daily program.

With the gas companies concentrating their promotional efforts on getting the women of their communities to attend the cooking classes, dealers will be tying in with the program by offering special prices on modern gas ranges. The mat service for dealers was therefore prepared from this angle. Each dealer mat advertisement naturally emphasizes the fact that the special offers being made on modern gas ranges are on account of Measured-Cooking Week.

The entire Robertshaw program was developed by the Gas Merchandising Division of Williams & Saylor, Inc., merchandising and advertising counsellors to the Robertshaw Thermostat Co. and is being thoroughly merchandised to the entire trade.

Consolidated Gas Co. New York, Changes Corporate Title

The Consolidated Gas Company of New York has changed its corporate name to New York Consolidated Edison Company of New York, Inc. The change in name affects only the parent company of the group of gas and electric companies doing business in New York City and Westchester County.

The Consolidated Gas Company of New York came into existence at 1:00 p.m. on Monday, November 10, 1884, as a consolidation of a number of independent New York gas companies. Five men have served as president of the company—Charles Roome, 1884-1886; James W. Smith, 1886-1894; Harrison E. Gawtry, 1894-1904; George B. Cortelyou, 1909-1935; and Frank W. Smith, 1935 to date.

John E. Montgomery Dies

John E. Montgomery, who for the past 16 years has represented American Meter Company in the Southern States, died March 3 in Birmingham, Ala.

Mr. Montgomery was born in 1870 Starting his career as a master plumber in Huntsville, Ala., he subsequently joined the gas company in Cincinnati, Ohio. Later with the old Birmingham Railway Light & Power Co. he became Superintendent in charge of street main work and distribution.

ISBELL-PORTER COMPANY

Engineers and Contractors for Complete Gas Works

I-P C

Manufacturers of All Kinds of Gas Apparatus

NEWARK, NEW JERSEY

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs

SUPERIOR METER CO.

167-41st Street
Brooklyn, N. Y.

FULTON
Cut-Out Latch
Regulator

If Gas Fails the Regulator will close and lock

THERE are no hazards due to failure of gas supply where the Fulton Cut-Out Latch Regulator is installed. Let pressure drop below the set minimum and the latch automatically shuts and locks the valve. Before flow will resume, the operator must open the valve by hand. Users of low-pressure furnaces and burners protect their equipment effectively, at little cost, by adoption of this safeguard. Ask for Bulletin 2987.

Dependable C-F Regulators for all requirements of pressure control are used in widely varied branches of industry. Catalog on request.

THE CHAPLIN-FULTON MFG. COMPANY
28-40 Penn Avenue Pittsburgh, Pa.

The Outstanding Gas Purifying Material » » »

Highest H_2S removal combine with complete removal of traces. Physical structure insures very low box back pressures

THE RECOGNIZED PURIFYING MATERIAL FOR VAPOR PHASE GUM CONTROL.

THE ALPHA-LUX COMPANY, Inc.

192 Front St., New York

Philadelphia **Chicago**

Missouri Association Meeting

The Missouri Association of Public Utilities will hold its annual State convention this year on April 29, 30, and May 1 in St. Louis, Mo., at Hotel Jefferson. C. E. Michel, Union Electric Light & Power Company, St. Louis, is president. The membership of the Association includes virtually all of the privately owned electric, gas, and water companies in Missouri.

Among the speakers and their subjects will be: "Electricity in the Olden Days—and Now," Alex Dow, Detroit, Mich., President, Detroit Edison Company; "Through the Years in the Gas Industry," L. B. Denning, Dallas, Texas, President, American Gas Association; "Hazards to Water Supply Due to Faulty Plumbing," W. Scott Johnson, Sanitary Engineer, St. Louis Health Department; "Rural Electrification in Missouri," D. W. Snyder, Jr., Jefferson City, Mo., President, Missouri Power & Light Company; "Looking Backward to See Forward," Gardner S. Howland, Chicago, Ill., General Manager, Electric Shops, Commonwealth Edison Company; "Where Are We Going, and Why?" Louis H. Egan, St. Louis, Mo., President, Union Electric Light & Power Company; "Service," H. T. East, Chicago, Ill., Public Service Company of Northern Illinois; "Welcome to St. Louis," E. P. Gosling, St. Louis, Mo., President, Laclede Gas Light Company; "More Safety, Less Accidents," J. M. Strike, St. Joseph, Mo., St. Joseph Railway, Light, Heat & Power Company.

"Safety of Gas" Exhibit

The safety features of modern automatic gas appliances were emphasized by the Consolidated Gas Company of New York in a special exhibit at the Seventh Annual New York Safety Conference, held at the Hotel Astor from March 3 to 5.

The general theme of the exhibit was: "Safety of Gas—preventing that one chance in a million." The major appliances shown were the gas range, gas refrigerator, automatic house heating apparatus, and the gas water heater. The gas safety pilot, which shuts off the supply of gas to an appliance if for any reason the pilot flame is extinguished, was the "star" of the show.

The many interested visitors at the exhibit learned that the modern gas range has automatic lighting for top burners and oven burners, which means automatic relighting of the burners if the flame should be extinguished. There is no escape of gas into the kitchen. The automatic safety pilot was also stressed as a safety feature of the modern gas range, since no gas can be delivered to the burner unless the pilot light is burning.

The extent to which the gas industry has gone in assuring safe operation of modern gas appliances was pointed out as follows:

"The Gas Refrigerator Safety Burner—you may never do it, but if you did turn on the gas cock and forget to light the burner, there would be no escape of gas . . . preventing that one chance in a million.

"Safety Pilot for House Heating Conversion Burner—chances here are as slim as in other cases we've shown, but should the pilot go out, gas will be automatically shut off . . . preventing that one chance in a million.

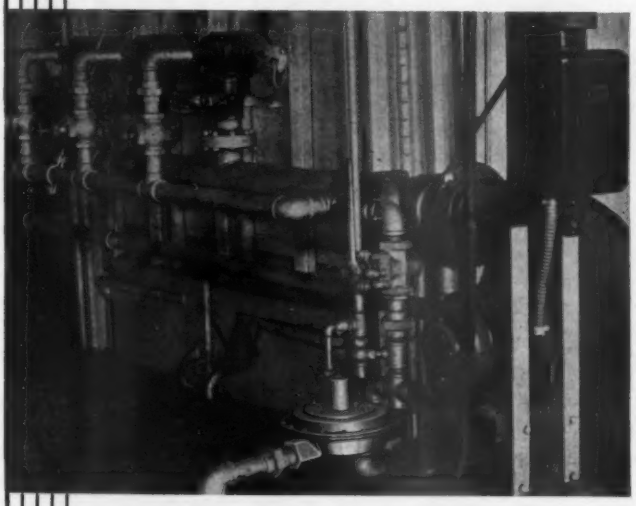
"Gas House Heating Furnace Safety Pilot . . . unaccountable, perhaps, but pilots have been known to go out—when they do, gas is automatically stopped . . . preventing that one chance in a million."

The temperature and pressure relief valve, which guards against the possibility of mechanical failure, and the safety pilot were pointed out as safety features of the automatic gas water heater. "It would take a gale to blow out the pilot light," one poster said, "but if it were done, the gas would automatically cease to flow."

The exhibit was designed and constructed by the Display Division of the Consolidated Gas Company of New York and affiliated companies, R. M. Martin, director.

The Hoyt Double-Seal Fitting is a forty-five degree plus a ninety degree Connection
ECONOMICAL INSTALLATION
Helps To Sell—
Storage Water Heaters
By installing ⅜" Copper Tubing by Hays Copper Plumbing Method in place of ¾" Galvanized Pipe in 37 ft. length from storage to faucet it was possible to deliver hot water at 150° F. for 1,930 cu. ft. of gas per month or at $1.60 per M.C. F.—$3.00. Same installation with ¾" Galvanized Pipe required 2650 cu. ft. of gas at a cost of $4.04. Sell economy and you sell more new heaters.
The above performance is an average of 34 tests conducted to prove the economy of small size tubing for hot water lines. Write for Hays Catalog on Copper Plumbing.
400 STYLES and SIZES APPROVED BY UNDERWRITERS LABORATORIES
Use 3/8" Copper Pipe and Hays Double Seals for these reasons
1. Copper is rust proof—lasts a lifetime.
2. Mirror smooth interior prevents clogging.
3. High Velocity through small tubing has flushing action.
4. Copper pipe is flexible—smooth bends reduce frictional loss. Flexibility allows for shorter runs from storage to faucets.
5. Every Hays Double seal Joint is a Union Joint. Easy to break lines.
6. Small amount of water in tubing minimizes heat loss from radiation.
HAYS MANUFACTURING CO. ERIE, PA.

Industrial



A Reynolds Industrial Regulator in service at the Chicago Heights Plant of the Columbia Tool Steel Company.

Greater capacity . . . increased range . . . quicker response . . . these are decided advantages of Reynolds Improved Gas Regulators for industrial control. They assure smooth, constant outlet pressure and volume even though inlet pressure and volume are irregular. Manufactured in single or double valve construction, Reynolds Industrial Regulators are proved by performance in factory tests and on installations throughout the world.

REYNOLDS PRODUCTS

High Pressure Service House Regulators—Straight Lever Type—Models 0-10-20 series; Toggle Lever Type—Model 30 series.

Low Pressure Service or Appliance Regulators.

District Station Regulators, Single or Double Valve—Auxiliary Bowl and Automatic Loading Device Optional.

High Pressure Line Regulators—Pilot Loaded—Pilot Controlled.

Toggle Type Regulators—Single Valve, Double Valve, Triple Outlet.

Seals—Dead Weight or Mercury. Back Pressure Valves . Automatic Quick Closing Anti-Vacuum Valves . Automatic Shut Off Valves . Lever Operated Valves . Louver Operated Device . Atmospheric Regulators . Vacuum Regulators.

Branch Offices:
421 Dwight Building
Kansas City, Mo.
2nd Unit,
Santa Fe Bldg.
Dallas, Texas

Representatives:
Eastern Appliance Co.
Boston, Mass.
F. E. Newberry,
Avon, N. J.

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

This Kitson Valve

prevents

EXCESSIVE TEMPERATURES in the Tanks of Manually Operated GAS WATER HEATERS

This "Watchman" Emergency Gas Shut-off Valve (Lovekin Patent) is particularly recommended for non-automatic or side arm gas water heaters. It prevents the overheating of the water by shutting off the gas supply when the temperature in the lower circulating line between heater and tank reaches 145°. After operating, the valve can be re-opened by pushing button. This valve operates through a bi-metal control element.

We suggest that you send for literature regarding this and other Kitson Safety Devices (Lovekin Patents) for use on Domestic Water Heaters.

Kitson also manufactures Ground Key Stops for Gas and Water — and Brass Plumbing Products.

KITSON COMPANY
261 No. BROAD ST.
PHILADELPHIA PA.

(Established 1897)

Experience in Leak Proofing Bell and Spigot Joints

(Continued from page 23)

This was evidenced by twisting a small piece of the top section yarn from which the liquid exuded. The front ring of yarn was quite moist for about ½ of the height and showed a decreasing amount to the top. At that time we had no equipment to determine accurately the amount of liquid present in the yarn, as this was developed later. The second joint was held intact and removed to our laboratory where it was given a pressure test. The joint was tight as shown by the soapy water test up to 2 pounds which was the limit of pressure available. Subsequent examination of this joint showed about the same condition as the joint broken open on the job, except that there was a lesser amount of jute in the joint.

The section of street involved in the treated area has been tested carefully at regular intervals and at this writing about 2½ years after the original treatment, we find no indication of the original trouble. During this period we have had two leak cases, at widely separated points, both of which proved to be service conditions. The cost of the treating job including all labor and material was about $365. which is about 2.7% of the cost of the main replacement job, and 7.5% of the cost of the clamp job.

I would like to cite one more case similar to the above, which occurred in our "K" district. In October, 1933, one of the stores in the business section reported the presence of gas to the extent that they found it advisable to close the store. The first bar hole had a definite indication and after a check-up was made, others were located with similar intensity. We started an excavation over the strongest hole and then proceeded to aerate the nearest holes. On uncovering our main we found a joint leaking completely around the bell. A second joint was uncovered and it was a similar condition. The joints were temporarily clamped and thru the ground ventilation provided, the building in question quickly cleared of gas and business was resumed.

Bar holes were continued in bilateral directions and practically all of them gave adverse indications. We decided to treat this section of main which involved a distance of 560 feet. After the treatment, aeration was carried on at each bar hole for approximately five minutes. The clamps on the offending joints were removed and the joints found to be tight two days later. Tests were also made at each bar hole for evidence of gas. An odor was present in only three bar holes. The J-W indicator was used as a check on these holes and confirmed the odor. A second treatment was then given the main and the offending holes were again thoroughly aerated. Tests made in all of the bar holes later showed that the situation was entirely cleared up. We have had no recurrence of trouble with this main after a period of over two years.

Up to this time, I believe, the principal lesson we learned was not to expect immediate results from liquid treatment, and the importance of clearing the ground of residual gas, especially where gas had contaminated the soil for long periods.

While I might cite many cases similar to the above as experienced in the treatment of some 35 miles of main (3″ basis) no one should misconstrue this treatment to be a "cure all" or panacea for all the ills of a gas distribution system. Like all applications of this nature, there are some limitations which should be considered in the light of practical application. However, in our own experience, we have only found one yarn condition which completely defied the use of the treating liquid. That is the so-called "soaped yarn." We found that the liquid would climb vertically only about 2 to 3 inches in this yarn.

In streets proposed for paving we first bar the main to test for leaks and determine its general condition. We also dig up a representative number of joints for inspection, as well as a number of services at the curb to note their condition. Should conditions warrant, we treat the main and then get a re-check on the results. We find in our experience so far, that on the average, about 20% of the joints require clamping ahead of paving jobs and about half of these will be on the intersection fittings and laterals. Where it is possible due to proper elevations in a case of this kind, we treat the lateral street permitting the liquid to run into the main line.

In two cases we have discovered broken mains thru the loss of liquid which could not be accounted for. Both cases occurred in the winter season with plenty of frost in the ground.

Occasionally in the course of treating a considerable mileage of main, one does not get the usual sign of the liquid in the chosen drip at the low point. In checking this situation up, you will generally find that a drip which is probably not in the records, is in between your chosen high and low points. This occurs usually on streets which are of slight grade or where grades have subsequently been changed without notation in the records.

Some streets may take a considerable amount of liquid in excess of the theoretical amount. Low spots not properly graded, or with drip provision, will hold back some of the liquid. However, our experience shows this condition to be rare and particularly in the smaller sizes, especially 3″. In about 90 streets treated, we have had 3 which required prospecting to locate the lost liquid. We have had more difficulty with covered and lost drip risers than from any other source.

Many times it will be found that main grades do not follow surface grades and the liquid will travel to lateral streets where it is eventually found in the appropriate drip. Of course, nothing is lost in this manner, as a large section of main is treated.

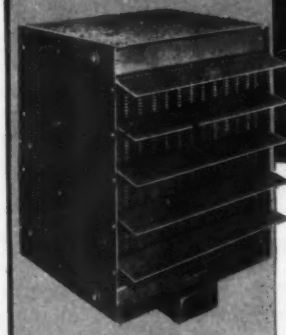
During the period of a year prior to the adoption of the joint treating process, we kept a careful record of the condition of the joints found in reconstruction work, prior to paving. We found that while a large percentage of the joints leaked, these leaks were in most cases really small as referred to a volume rate. In other words, what we had was a lot of very small leaks and I believe this is representative for many low pressure systems. The liquid joint treating process admirably contributes to a situation of this kind.

Organization for Field Work:

Each section of main proposed for liquid treatment is thoroughly checked in the records for gradient, drip locations, previous leak experience and similar data which will enable an intelligent field check. The Distribution Engineer then surveys the main in the field, designates whether the input point shall be on the main, service, back of the curb, or in the service end proper. The drip locations are then checked on the main run, as well as the drips likely to be used in the event the liquid runs through a lateral branch. The probable number of joints is computed against the length of main. Up to 8″ main size, 4 pounds of liquid per joint is set down as the amount of liquid to be run through the main initially.

This data is handed the Distribution Foreman who proceeds to carry out the work. If a main or service connection is required as an input

"Using CHACE Exclusively IN CHROMALOX ELECTRIC UNIT HEATERS" EDWIN L. WIEGAND COMPANY



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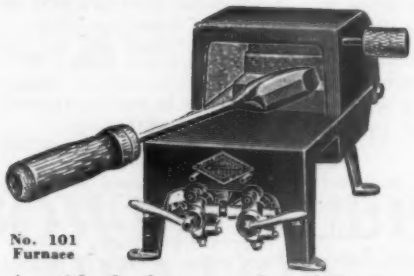

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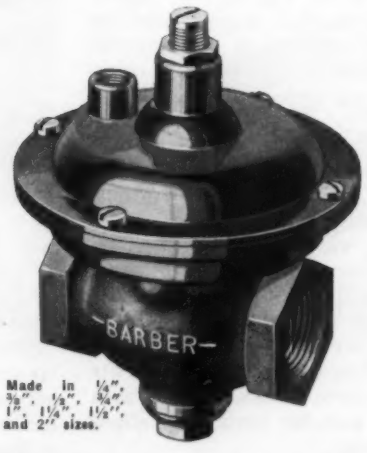
Regulator

—means Better Performance for Appliances You Sponsor or Sell



Made in ¼", ⅜", ½", ¾", 1", 1¼", 1½", and 2" sizes.

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Barber Regulators are winning wide preference because of exceedingly low pressure drop, compact design, all-bronze bodies, and precision of operation. *Reliable* Pressure Regulators greatly reduce service calls and complaints on gas bills.

Write for complete literature, prices and discounts on the entire Barber line of Burners and Regulators.

•

THE BARBER GAS BURNER COMPANY
3704 Superior Ave., Cleveland, Ohio

station this work is carried out the day before in connection with other work. Should a treating program be under way, the work is so scheduled as to have the input stations ready as each job progresses.

The field operating organization is composed of a Foreman and two men. This crew is provided with a light "pickup" type of truck, (See Figure IV) on which are carried two full drums, or about 100 gallons of liquid. Two 25 gallon drums are also carried to facilitate handling the recovered liquid. The truck also carries curb boxes, drip pump, pails, tools, and similar equipment. The actual input of liquid is usually done at a rate of about 1 gallon per minute but can be increased by putting air pressure on top of the liquid. The latter method is now used on mains carrying up to six pounds gauge pressure, as well as other cases where a high input rate is desirable.

The rate at which the liquid travels through the main will vary with the length, gradient, temperature, and the rate of input. This time period may vary from less than an hour to several days. In all cases the liquid will run for a considerable period after the initial showing at the drip. We have had jobs where the liquid has continued to run for as long as three weeks. This was a 1% grade and the main was about 2100 feet long.

On recovery of the liquid it is strained through fine cheese cloth and if necessary after long use restrained again on the next input. Quality of the liquid is maintained by hydrometer tests and, if necessary, additional new liquid is added. In cases where the liquid does not come through to the predicted drip in a reasonable time, all the drips on nearby laterals are checked. If the liquid is still not located another 50 gallon run is made. Should no result come of this, we carefully study the probable low spot and put down an excavation. The main is tapped and a steel snake is run into the main in both directions. We can cover a run of 300 feet by this method and have always located the liquid. Generally the location leads to a covered and forgotten drip riser or a drip must be installed in the low spot which also serves as a "take-out" point.

The question of where to put the liquid into a given main is an important one. We have tried all sorts of schemes. Usually in the built-up sections, a service is available near the crest of a high point on one side or both, if both grades are to be treated. In these cases we cut the service between the curb and sidewalk and sleeve in a tee and cock. A riser is extended to the surface and a regular drip box installed. It is not absolutely necessary to place a cock in the service but the service

Fig. IV

should be thoroughly blown from the cellar end with a force pump after a treatment. If a cock is placed, the service is blown from outside and of course, the customer's installation is thoroughly checked before leaving the job.

If a street main opening and a connection to the main is made near to or at the crest of the high point, a direct run of liquid is made to the one side and then a piece of hose is run through the tap and the main far enough to reach the opposite side of the high point. The hose when in position is "soaped" so that it will be gas tight during the "input" operation.

Recently we developed a method of putting the liquid directly into the cellar end of the service. A small 25 gallon drum (to facilitate handling) is set up outside the nearest cellar window. A hose is run to the service end and connected with a lever shut off cock and union. Great care is used to keep all connections tight and in good order to avoid spilling any liquid. A pail is placed under the service end to catch any possible drippings. To date we have used this method in many cases and as yet have received not a single complaint nor have we been refused permission which is always requested well in advance. This method is the most economical but obviously cannot be used in all cases and is not recommended for the so-called better neighborhoods.

We feel that the curb location is the best for all 'round consideration. The cost of our main input stations will run about $15.00 exclusive of paving, with $10.00 for the service job.

Records:

We maintain a progress map which indicates in color the streets treated and supports this with field sheets which give the data required to determine the permanent input points and the supporting drips. The key map is in several allocated colors by years so that the streets treated in any one year are seen at a glance.

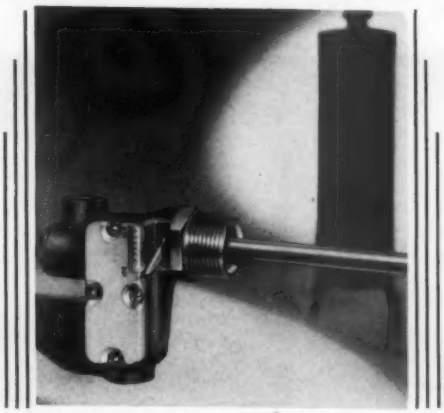
The liquid used in a treating program is weighed out, and in, once each week and the usage is calculated on a 3″ joint basis. We kept fairly accurate records for the first year as to costs, by individual jobs. There is such a wide variation, however, that we now determine costs over a longer period and on a 3″ equivalent main basis.

Economics:

For the first two and one-half years of the use of the liquid joint treating process on which we have fairly complete records, the following data is shown:

Actual miles of main treated 3″ to 12″	16.11
Miles of main on a 3″ equivalent basis	34.40
Total barrels of liquid used	19
Total weight of liquid	9,628 lbs.
Average number of joints per mile	500
Total liquid used per mile of actual main	597 lbs.
Total liquid used per mile of 3″ equivalent main	280 lbs.
Total joints in sections treated	8,055
Total joints in sections treated, 3″ equivalent basis	17,200
Lbs. of liquid used per actual joint	1.2 lb.
Lbs. of liquid used per joint, 3″ equivalent basis	0.56 lb.
Total miles of main in low pressure system	138
Total miles of main in treated sections	16.1
Percent of total miles treated 10/1935/	8.6%
Average percent treated per fiscal year	3.42%
Total cost of liquid	$1925.
Average cost per joint, material only	$ .239
Average cost per joint, labor only	$0.380
Average total cost per actual joint	$0.619

Material and labor costs were kept on 4.2 miles (22,232), representing the first year of use. These figures include special supervision and expense which would not be required under a developed technique. They



Titan Snap Action Thermostats deserve your complete confidence. Their reliability has been proven by years of hard service under all conditions with all types of gas. TITAN controls are attractive, sensitive, rugged, trouble-free, service-proof. They are used on most automatic storage heaters approved by the American Gas Association.

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would probably be representative of the average company cost for the introductory period. The mileage represented is on an actual basis and covers 4", 6", and 8" main. Thirteen jobs are represented and they vary in length from 232' to 2100' covered by a single run of main. A summary of these costs follow:

Total footage of main treated, 4", 6", 8"	22,232'
Total liquid used	3112 lbs.
Number of actual joints treated	1905
Lbs. of liquid used per joint	1.63 lb.
Liquid cost per joint	$.326
Labor cost per joint (including special supervision)	$.47
Labor cost per joint (excluding special supervision	$.38
Total cost per joint—material and labor	$.706
Liquid lost through broken mains, drip riser, spillage, etc., and included in above figures	700 lbs.

Conclusion:

In conclusion, it may be pointed out especially that this method is particularly adapted to bell and spigot joint distributing mains which have been subjected to dry or partially dry gas. However, there are many cases related to the foregoing which should be given careful consideration. Many systems have a zone near the plant which is supplied with saturated gas, while the outlying sections are supplied from booster pressure systems through governors. In this latter situation, the reduced saturation of the gas will ultimately result in a contraction of the packing in the joints. I have personally witnessed the dissembly of joints in the fringe territory where the packing was as dry as a bone.

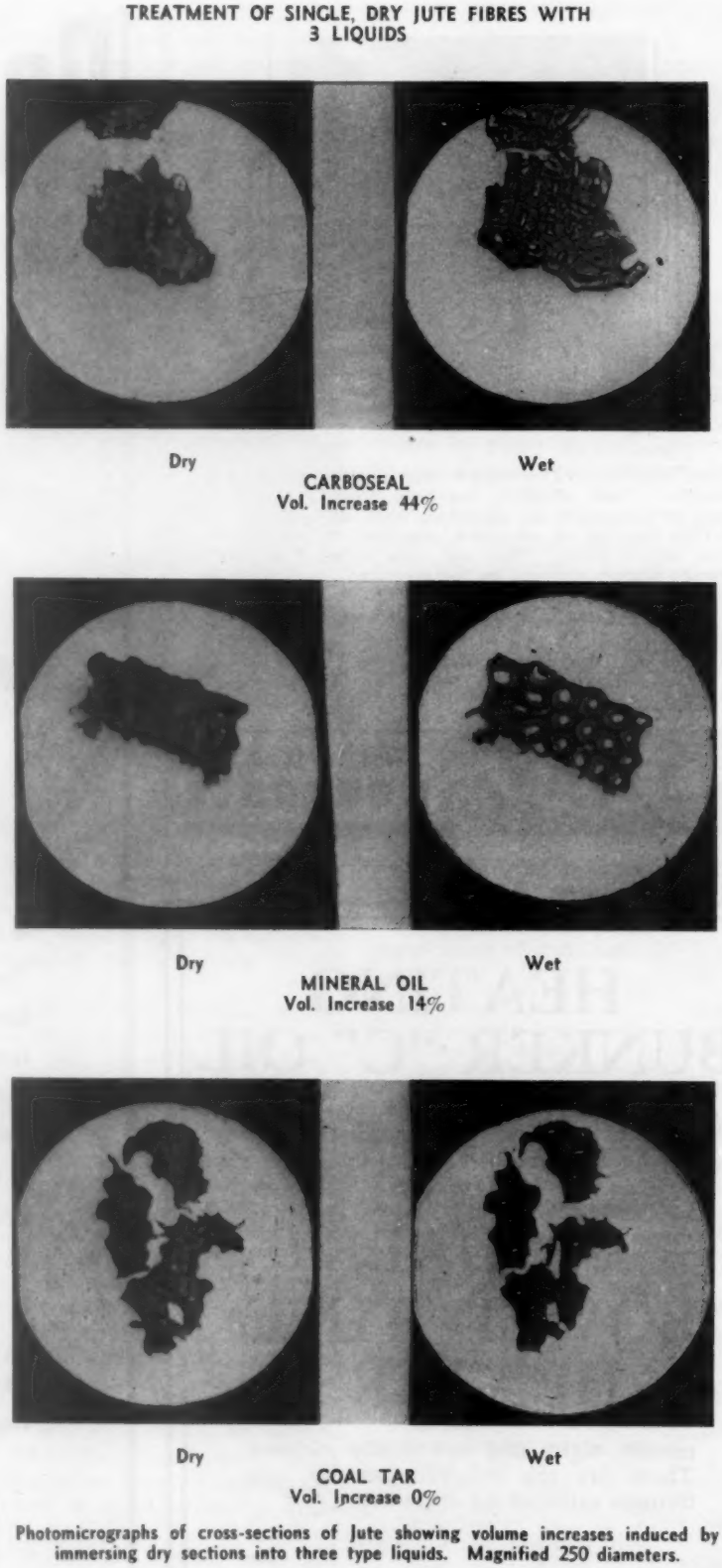
Most of the condensation in a saturated system take splace in a defined area within certain distance limits from the plant. Joints not subject to a wetting atmosphere will profit by the liquid treatment.

It is evident to all that the reduction in street excavations on improved streets is an advantage in many ways. It not alone saves a lot of money, but reduces traffic and pedestrian interference and secures a general improvement in relations with the public and the public officials.

Our three years' experience with this method of stopping and preventing leaks in our system leads us to believe that the method is efficient, practical, and economical.

In conclusion, I wish to point out that great credit is due the United Gas Improvement Company, whose laboratories have worked continuously for the past two years to perfect the compound now known commercially as "Carboseal"*. The industry is indebted to that organization for this forward step in improving the efficiency of our gas distributing systems.

Manufactured and sold by Carbide and Chemicals Corp., 30 E. 42nd St., New York, N. Y.



Photomicrographs of cross-sections of Jute showing volume increases induced by immersing dry sections into three type liquids. Magnified 250 diameters.

FOR SALE - - - - (3) GAS PURIFIER BOXES

Mfgr.—Cruse-Kemper—Size 18 ft. long, 12 ft high, 20 ft. wide. Type—Non-reversible flow. Cover, steel with packing seal. Compartments, two each box. Total capacity, 1,566,000 cu. ft. per day. Inlet connections, 12″; Outlet Connections, 12″. Hoisting Apparatus—Steel, frame work above boxes with trolley and chain hoist. First class condition. Installed 1926. Approximately two years service.

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The Reliable Shut-Off for Street Mains

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METER REPAIR PARTS

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ALL MAKES — ALL SIZES OF METERS

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SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES
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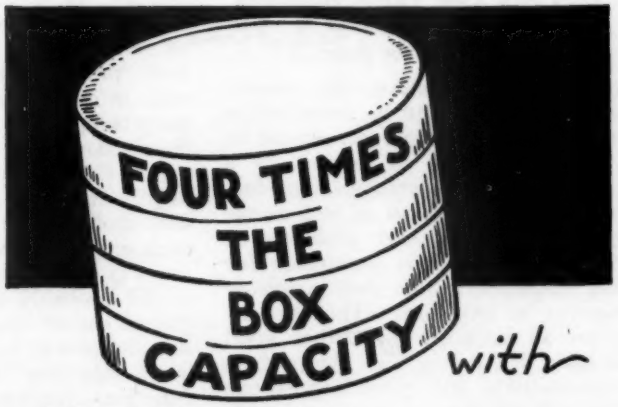
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.



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Requiring no mixing, it is easier to handle and fill boxes. And the fouled material can be sold for Sulphuric Acid manufacture.

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No obligation.

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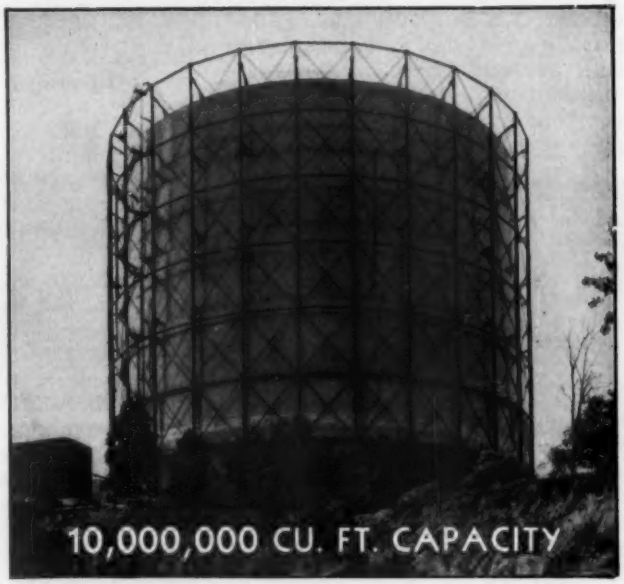

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INTEGRITY GOOD WORKMANSHIP FAIR DEALING

CRUSE-KEMPER CO.
AMBLER, PA.

Who Are Your Public Relations Representatives?

(Continued from page 18)

cial contacts whenever the interest of the company can be protected or advanced. All employees should be carefully trained in regard to a thorough understanding regarding their own department as well as the general activities and problems of the company. It is impossible for any employee to lose their company identity at any time. They are always an influence for either good or bad. Have they been shown their responsibility and given suggestions that will aid them in being creditable representatives?

General Contacts

The door of every executive office must be opened to any and all customers in order that the impression may be created that no executive is too busy or too important to give his personal attention to any and every customer request.

All correspondence clerks should be carefully trained in order that every letter may be thoroughly representative of the company and its attitude toward the public. It is very easy to create a wrong impression through statements made in a letter because there is not the opportunity to correct a misunderstanding that may be created. Many employees with the very finest intentions are unable to express themselves effectively in writing. They should be given special training.

Many purchasing agents are responsible for antagonizing many who are trying to do business with your organization through failure to be courteous and considerate. It is obviously impossible for the Purchasing Department to give orders to all who have something to sell but no salesman should be permitted to leave without feeling that he has had fair, considerate and courteous treatment. Many purchasing agents are popular with everyone who calls on them even though it is necessary for them to turn down just as large a percentage as the one who is notoriously unpopular.

In summing up this subject it might be said that every organization faces two major responsibilities in connection with the personnel. First, it is necessary to build a personnel that is friendly and cheerful, personality must be considered of equal importance with ability. Second, it is necessary to challenge the imagination of every individual in order that they may realize the important part which they play in the welfare of their company. They must be inspired with a true spirit of service; there must be developed that "pride of organization" which will insure the welfare of the company being given first place in every transaction and every customer contact. Every employee must thoroughly understand both the products and problems of the company. If each employee were required to fill out a questionnaire on this subject it would probably develop a startling realization of how inadequate their knowledge was on this subject. It is impossible for any individual to function intelligently without a thorough appreciation of every problem.

It might be helpful to stage a courtesy and public relations contest in which prizes are offered for the best essays by employees on how they in their position can help to build good will. A contest of this kind would very definitely disclose the kind of educational and inspirational effort that is necessary to build up the public relations value of each individual employee to the highest standard of efficiency.

The Law of Gas Sale Contracts

(Continued from page 28)

ments needed to supply *its distributing system, its power plant* and for re-sale purposes. Neither pipe line nor gas distribution system was constructed pursuant to the above contracts.

The McPherson Gas Company, taking note of the foregoing events, consented to a reduction of its rates. The city passed an ordinance containing a new contract between the city and the gas company. On the basis of the new rates, the city agreed to take its entire natural gas requirements from the gas company. This new contract took cognizance of the contract between the city and the Hutcherson Company and it was made a condition of the agreement that the city be relieved of any obligation to the Hutcherson Company. The city agreed to assign the Hutcherson Company contract to the gas company or to surrender it for cancellation if the gas company arranged with the Hutcherson Company for its cancellation. To effectuate its purpose and duty of relieving the city from the obligation of the Hutcherson contract, the gas company purchased the stock of the Hutcherson Company and agreed to perform or cause to be performed the contract between the Hutcherson Company and the Derby Oil Company.

Suit was filed by the Derby Oil Company on the grounds that the Hutcherson Company should pay for at least 150,000 cubic feet although actually the city did not consume this much yearly. In deciding against the Derby Oil Company the Court said:

"The fact that the city changed its plans and abandoned the idea of establishing its own distributing system and competing with the gas company for the business of supplying the consumers of the city . . . is not a matter open to objection from the Derby. The city did not bind itself to construct a distributing system and sell gas to its inhabitants . . . The rule for interpretation of written contracts which requires that force and effect be given to the meaning that would be attached to the writing by a reasonably intelligent person in possession of all the facts is exceedingly relevant to the situation here presented."

Galvanized Tank Corrosion on Automatic Water Heaters

(Continued from page 32)

quite active, is said to be between 140° and 176°F. If the water in storage tanks can be controlled at 140°F. and below, such control would greatly tend to lessen corrosion, other factors being normal. The uncontrollable furnace coil and indirect heaters not only give dependable hot water, but create higher water temperatures that may go as high as steam heat. Temperature can therefore be considered as one of the important factors of corrosion.

(To be continued in May issue)

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1876 [USE THE BENEFIT of 60 YEARS EXPERIENCE] 1936

Circulating Humidification Requirements

(Continued from page 36)

to lower humidity as weather gets colder and to higher humidity as weather gets warmer. Resettings must be fairly frequent in homes having single glass windows.

Humidistats automatically turn the water supply to the evaporating pan fully "on" when more evaporation is required and "all off" when less evaporation is required. Such humidistats cannot, however, control the room humidity accurately unless the evaporating pan has adequate water surface area and is properly proportioned as to depth. The rate of water feed should also be throttled down to not over two or three times the required rate of evaporation for 35 degree weather. If the feed rate is too rapid it will chill the water in the pan to an extent which may reduce instead of increase the rate of evaporation. A combination of excessive rate of water feed and excessively large water volume in the pan can make a humidistat almost useless.

Another method of humidity control is to feed the water to the evaporating pan at a constant rate regardless of weather. When the feed rate is set at a point that will raise the room humidity just up to the window condensation point it will cause the room humidity to become less as weather gets colder and higher as weather becomes warmer, closely following the window condensation point and thus automatically preventing excessive window condensation.

Several other humidity controls designed to graduate the room humidity to automatically conform to changes in weather and window temperatures are at this writing in process of development and will no doubt soon be announced by their manufacturers.

Meters and Metering

(Continued from page 37)

laneous direct expenses other than the actual labor and material necessary for repair.

The accounts, Removing and Resetting Meters, and Repairing Meters on Consumers' Premises should be included in the total cost of metering, but are not to be included in meter shop cost of maintenance of consumers' meters as defined at the beginning of this account classification.

Each company comparing costs should indicate whether or not rent is charged against maintenance of consumers' meters. If rent is so charged, it should not be included in any of the above expenses used for calculations of costs per meter, but should be designated separately. Then shop costs will still be comparable whether or not the meter shop is charged for the building space.

Then the total cost of maintenance of consumers' meters may be easily presented for comparison on a basis of per meter in use, per meter owned, or per meter repaired, outlined as follows:

(A) Distribution Superintendence	$ per
(B) Distribution Supplies & Expenses	$ per
(C) Maintenance of Consumers' Meters—Overhead	$ per
(Sum A, B, & C) Total Overhead	$ per
(D) Labor	$ per
(E) Material	$ per
(F) General Expenses	$ per
(Sum D, E, & F) Total Direct Expenses	$ per
(Sum A through F) Total Maint. Cons. Meters	$ per
Rent	$ per

Sections (2) and (3) will show how the amounts in each of these accounts may be allocated between the various classes of repair.

National Advertising

(Continued from page 19)

the industry in favor of national advertising. Appropriate resolutions were adopted, and Mr. Herman Russell, President of Rochester Gas and Electric Corporation and Vice President of American Gas Association was appointed Chairman of the Committee on National Advertising. Thanks to the ability and untiring efforts of Mr. Russell and his Committee the necessary support has been assured. There will be problems, delays and disappointments; but the matter is in able hands and will go forward to success, just as did the "Mystery Chef" program. The *Journal* has followed the work of the Committee from the start and believes that what it plans to do is vital to the welfare of every member of the gas industry. It is our opnnion that every management that is sincerely interested in the future growth and prosperity of its gas properties should support this effort to place the desirability of gas service squarely before the public.

GAS HOLDER LIFE INSURANCE

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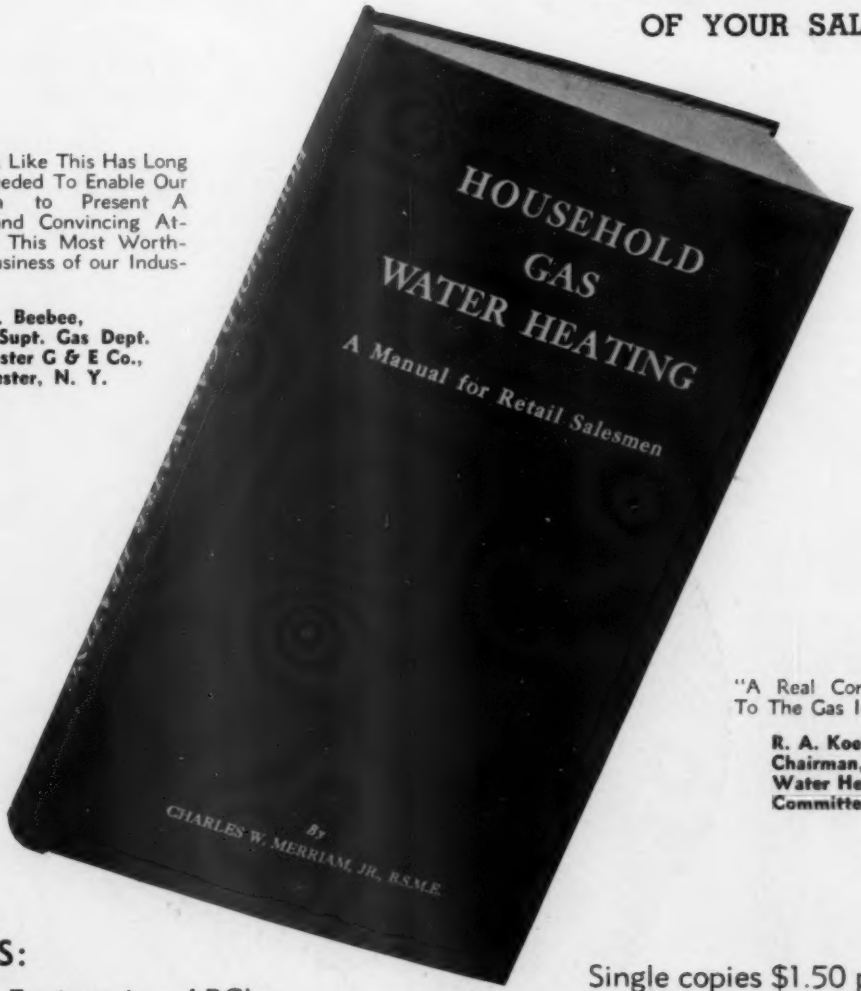

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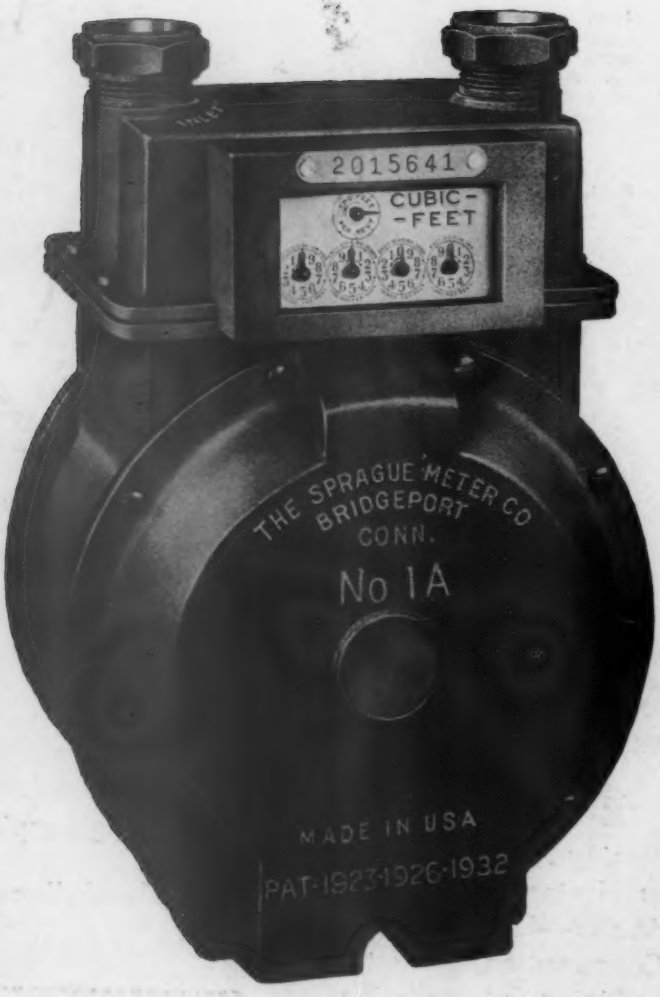

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